ASM REVIEW OF METAL LITERATURE 1950

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REVIEW OF METAL LITERATURE

An Annotated Survey of Articles and Technical Papers Appearing in the Engineering, Scientific and Industrial Journals and Books, Here and Abroad, Received in the Library of Battelle Memorial Institute, Columbus, Ohio.

Volume 7
1950

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PREFACE

The A.S.M. Review of Metal Literature is a monthly feature of Metals Review, published by the American Society for Metals and distributed to its members. The present volume is a collection of the installments published in Metals Review from February 1950 through January 1951, and represents a complete survey of the metallurgical literature published during the period January through December 1950. It is the seventh volume in a series that began in 1944.

The annotations are not intended to serve as a substitute for a reading of the articles listed. They are brief abstracts designed to indicate the scope and content of the article so that the reader may determine whether it is something he wants to read in its entirety. In other words, they are indicative rather than informative abstracts.

The present volume differs from its predecessors in the method of classifying the annotations into subject subdivisions. The new arrangement is patterned after the "ASM-SLA Metallurgical Literature Classification," designed by a joint committee of the American Society for Metals and the Special Libraries Association, and published by the American Society for Metals during 1950.

The table of contents lists the main headings into which the A.S.M. Review of Metal Literature is subdivided, together with secondary subdivisions indicating the scope of the main heading. The main sections are designated by capital letters, while the subdivisions are accompanied by numerals which refer to the coding system used in the "ASM-SLA Metallurgical Literature Classification." Each annotation in the text of the book is likewise followed by code symbols which refer to these main and secondary subdivisions. For example, the symbol "C21" in parentheses at the end of an annotation indicates that the literature reference has to do with "Nonferrous Smelting and Refining" (C), and, specifically, "Smelting" (21).

The main divisions of the classification refer primarily to "processes and properties," with a final section "V" to include literature references dealing with specific materials and covering various processes and properties in a broad and general way. Materials are likewise coded by symbol at the end of each annotation, the code for materials following the symbols for processes and properties. Chemical symbols of the elements are used to code

metals and alloys. In addition, various materials groups are coded. For example, "EG" plus a lower-case letter refers to an "Element Group," "SG" to "Special Groups," and various combinations of capital letters indicate types of steels and cast irons. For example the symbol "C21" might be followed by the symbol "Cu," written "(C21, Cu)" and indicating that the reference had to do with smelting of copper alloys. This coding system is explained in detail in the ASM-SLA Metallurgical Literature Classification.

An understanding of this coding system, however, is not essential to the use of this volume of the Review of Metal Literature, which is accompanied by a complete subject index starting on page 759. Since the annotations are classified primarily by processes and properties, the subject index has been prepared with the emphasis primarily on materials. Subheads and cross-references are included in sufficient detail to permit the location of articles on any specific subject related to the metal industry. Indexing is based on the content of the article and not merely on the title.

In using the book, if the primary interest is in the broad field of corrosion, or foundry practice, or heat treatment, turn immediately to the respective section as given in the table of contents. If the main interest is in aluminum alloys, or copper, or cast iron, turn to the corresponding heading in the subject index. If interest lies in specific aspects of foundry practices, or a particular type of heat treatment, these broad processes will be found broken down and subdivided in the subject index. An author index is also provided and a list of addresses of the journals and periodicals from which the literature references are taken.

The actual preparation of the annotations has been under the direction of W. W. Howell, technical abstractor at Battelle Memorial Institute, assisted by Pauline Beinbreck, N. W. Baklanoff, Fred Rothfuss, and Leila M. Virtue, the last three working on foreign language abstracts.

Marjorie R. Hyslop
Editor

May 1, 1951

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1A. Scovill's Continuous Brass Mill —the World's Most Modern Mill. L. P. Sperry. *Iron Age,* v. 164, Dec. 22, 1949, p. 59-72.

Details of materials handling; flat-bar, continuous-casting, induction-melting furnaces; rolling mills; annealing furnaces; slitting lines; and spray-pickling lines. (A5, F23, Cu)

2A. Light Metals and National Defense. L. M. Brile. *Light Metal Age,* v. 7, Dec. 1949, p. 9, 18.

Power and ore-supply situation. (A4, B10, Al, Mg)

3A. Economics of Owning a Pressure Die Casting Machine. Part II. Eric James. *Light Metal Age,* v. 7, Dec. 1949, p. 10-12, 22-23, 31-32.

Economic factors involved in deciding whether or not to do one's own die casting or to purchase the die castings needed. (A4, E13)

4A. Liquid Wastes: New Ways To Crack a Common Problem. *Modern Industry,* v. 18, Dec. 15, 1949, p. 44-48.

Varied techniques now in use for disposal and productive utilization. (A8)

5A. The Growing Western Market for Better Graded Scrap. L. S. Dahl. *Western Metals,* v. 7, Dec. 1949, p. 32, 34.

Need for better scrap, and operating problems. (A8)

6A. The Nickel Industry in 1949. Robert C. Stanley. *Metals,* v. 20, Dec. 1949, p. 6-7.

Economic trends. (A4, Ni)

7A. Tin Market Should Be Free With Prices Determined by Supply and Demand. G. W. Simms. *Metals,* v. 20, Dec. 1949, p. 9-10, 12.

Proposed restriction of production of the Malayan tin industry. (A4, Sn)

8A. World Copper Market Outlook Depends Largely on Business Conditions in U.S.A. Chester Beatty. *Metals,* v. 20, Dec. 1949, p. 11-12.

(A4, Cu)

9A. Fontana's Steel Plant Still Growing. James Blane. *Western Machinery and Steel World,* v. 40, Dec. 1949, p. 66-69, 98-99.

Miscellaneous steelmaking and fabrication equipment and procedures. (A5, ST)

10A. Metalworking Prospects for 1950 and Imprints of 1949. *Steel,* v. 126, Jan. 2, 1950, p. 99-108.

An economic forecast and discussion. (A4)

11A. Metalworking Facts and Figures. *Steel,* v. 126, Jan. 2, 1950, p. 123-154.

Statistical data, tabulated and charted. (A4)

12A. Metallurgy. *Steel,* v. 126, Jan. 2, 1950, p. 166-170.

Brief reviews and forecasts: More Realism Recommended to Appraise Powder Metallurgy, W. R. Toeplitz. Super Machining Steels Increase Production, Maurice N. Landis. Popularity of Magnesium Alloys Increasing Rapidly, Charles E. Nelson. Fabrication Improved by Metallurgical Discoveries, Arnold P. Seasholtz. Usefulness of Materials Increased by Redesigning, C. A. Crawford. Applications of Low-Carbon Drawing Quality Steel Gain, C. L. McCuen. 400-Pound Titanium Ingots Now Common, F. R. Hensel. Theoretical Research Hits New High, R. H. Harrington. Aluminum Bronze Alloys Reveal Great Potentialities, J. F. Klement. Spring Industry Extends Use of Alloy Steels, F. P. Zimmerli. Rationalization of Hardenability Foreseen, B. F. Shepherd. Titanium Developments Spur Heat Treating Furnace Demand, Willard Roth. Weldability of High Heat Alloys Improved, Paul Goetcheus. Metallurgi-

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13A. Equipment. *Steel,* v. 126, Jan. 2, 1950, p. 190-192, 194, 197, 198.

Brief reviews and forecasts: Envisions Research Aiding Pressure Vessel Industry, Fred L. Plummer. The Amplistat—New Tool for Steel Industry, H. W. Poole. Trend of Progressive Manufacturing Disrupted, Robert E. W. Harrison. Fabricators to Be More Receptive to New Methods, W. C. Denison, Jr. We Must Adapt Our Products To Fit Foreign Requirements, S. Menton. Corrosion-Resistant Metals Cut Equipment Maintenance, Everett C. Gosnell. Flexibility of Induction Heating Emphasized, R. N. Blakeslee. Extensive Use of Low Hydrogen Electrodes Noted, A. N. Kugler. J. I. C. Hydraulic Standards Welcomed by Industry, S. B. Taylor. Higher Standards Increase Product Demand, R. G. Widdows. Portable Power Tools Play Important Cost-Cutting Role, Neil C. Hurley, Jr. Plans for New Mills Now Include Scarfing Machines, A. J. Miller. Machine Shape Cutting Now Universal Process, R. F. Helmkamp. Use of Variable Voltage Drives Increases, R. A. Geuder. Oil Well Drilling Tools Pose Tough Metallurgical Problems, Daniel J. Martin. Blast Cleaning Integrated in Steel Rolling Mills, C. R. Cline. New Technique Invaluable in Making Interference Fits, A. Stewart Murray. "Special" Machines With High Flexible Performance Needed, Oscar L. Bard. Adjustable Voltage System Adds New Speed, A. Novara. Management's No. 1 Problem—Boost Output or Else, George T. Trundle, Jr. Leases Unit for Generating Oxygen on Premises, F. E. Pavlis. Immersion Thermocouple Plays Important Role, Harry F. Walther. New Methods Improve Coupling Performance, John H. Schmid. Improved Products Result From Technical Cooperation, Thomas A. Wilson. (A5)

14A. Lubrication. *Steel,* v. 126, Jan. 2, 1950, p. 210-212, 214.

Brief reviews and forecasts: All-Purpose Greases in Great Demand, Joseph A. Rigby. Mechanical Gear Lubrication to Result in Big Savings, Frank L. Gray. Proper Lubricants Needed for Today's Rolling Mills, John P. Critchlow. Apply Cutting Fluids on Basis of Performance, Harry A. Erickson. How To Control Rust in Circulating Oil Systems, Clifford C. Goehring. New Fluids to Expand Use of Friction Drives, A. R. Black. Number of Lubricants to Be Minimized, James G. O'Neill, Jr. Good Lubrication Practice Vital to Efficient Production, E. Ralph Harris. Use of Iron Powder Machine Parts Increasing Steadily, A. J. Langhammer. Select Cutting Fluids on Production Performance, W. C. Lockwood. Bearing Manufacturers Study Lubrication, A. R. Spicacci. Industry Becoming Aware of Importance of Clean Oil, H. V. Miles. Chlorinated Hydrocarbons Aid Cold Forming of Stainless, E. L. H. Bastian. (A5)

15A. Metal Production. *Steel,* v. 126, Jan. 2, 1950, p. 224, 226, 228, 230-231, 234, 236-238.

More Obsolete By-Product Coke Plants to Be Replaced, W. A. Leech, Jr. Tap-to-Tap Time Cut by Close Check on Operations, J. L. Bray. New Steel Production Techniques Expected, G. G. Beard. Raw Materials for Steel Industry Much Improved, D. T. Rogers. Southern California Ore Smelted Successfully, F. M. Rich. Motor-Generator Sets Being Replaced by Rectifiers, W. R. Harris. Cost-Cutting Practices Felt by Nonferrous Producers, Austin R. Zender. Trend in Open Hearths Toward Large Furnaces, L. F. Reinartz. Sees Brisk Demand for Zinc Early This Year, Ernest V. Gent. Portability Available in Gas Cutting Equipment, S. D. Baumer. Beryllium Now Readily Available for Designer's Use, N. W. Bass. Coke to Continue in Short Supply, Philip S. Savage. Merchant Furnace Progress Helps Foundry Industry, B. C. Colcord. Sources of Raw Materials Occupy Industry's Attention, C. D. King. Curtailed Steel Operations Help Refractory Studies, H. M. Kraner. Intensified Search for Raw Materials Continues, Charles M. Parker. Abundance of Steel Only Way to Protect Profit System, Cottrell Farrell. Jet Piercing to Aid Processing of Taconite, D. H. Fleming. Nitrogen Degassing Eliminates Porosity Defects, E. F. Kurzinski. Suggests Use of Reformed Gases for Blast Furnaces, S. P. Kinney. Taconite Processing Plant Watched With Interest, E. W. Davis. Clad Metals Help Hold Down Equipment Prices, Robert W. Wolcott. Criterias for Selecting Steel Plant Sites Change, Ralph H. Sweetser. Air-Emplaced Refractories Reach All Parts of Furnace, Harvey N.

Barrett, Jr. Billet Size Ingot Practice Improves Cost and Yield, C. F. Ramseyer. Iron Ore Supply Problem Approaches Critical Stage, C. O. Dohrenwend. Difficulties Overcome by Slag Casting Ferro-Alloys, T. W. Merrill. Open-Hearth Shops Install More Basic End Furnaces, Raymond E. Birch. Blast Furnace Practice Faces Revisions, H. A. White. Specialized Refractories Lengthen Furnace Life, S. M. Swain. Advocates Closer Control of Fuel Consumption, Matthew H. Mawhinney. Many Opportunities for Reducing Ingot Costs, H. W. Potter.
(A4, C general, D general)

16A. Metallurgy Continues Progress. David C. Minton, Jr. *Chemical and Engineering News,* v. 28, Jan. 2, 1950, p. 27-28.
Developments of 1949. (A general)

17A. Chromium Removal by Ion Exchange and Comments on the Chemistry of Chromium Complexes. Don E. Bloodgood and Aubrey Strickland. *Water & Sewage Works,* v. 97, Jan. 1950, p. 28-32.
An attempt to develop a method for removing chromium from plating wastes, both for detoxifying the wastes, and for recovering the chromium, by utilizing ion-exchange resins. The resins are effective in removing the chromium from solution, but no satisfactory methods have been developed for regenerating the resins. 10 ref. (A8, Cr)

18A. Heat Treating; Powder Metallurgy; Stamping; Forming; Forging; Casting. *Iron Age,* v. 165, Jan. 5, 1950, p. 131-141.
Statistical data on production, operating costs, employment and wages, industry associations, prices, and highlights of '49. (A4)

19A. Steel Production, Steel Prices, and Markets. *Iron Age,* v. 165, Jan. 5, 1950, p. 151-163, 166.
Statistical data on output, prices, capacities, world production, and highlights of '49. (A4)

20A. Welding and Joining; Machining, Tools, Etc.; Fasteners. *Iron Age,* v. 165, Jan. 5, 1950, p. 183-192, 194, 196.
Production data, operating costs, employment and wages, value of product, industry associations, and highlights of '49. (A4)

21A. Nonferrous Metals. *Iron Age,* v. 165, Jan. 5, 1950, p. 211-220, 222, 224.
Statistical data on production, exports. and imports, consumption, stocks and orders, prices, and highlights of '49. (A4)

22A. Material Handling; Power Transmission; Metal Finishing; Testing and Inspection. *Iron Age,* v. 165, Jan. 5, 1950, p. 245-252, 254, 258, 262.
Statistical data on production, employment and wages, value of product, material prices, industry associations, and highlights of '49. (A4)

23A. Metal Products—General. *Iron Age,* v. 165, Jan. 5, 1950, p. 267-276, 278.
Statistical data for automobiles, railroads, farm equipment, housing, appliances, and national income.
(A4, T general)

24A. Ore; Coke & Coal; Pig Iron; Scrap; Refractories. *Iron Age,* v. 165, Jan. 5, 1950, p. 283-293, 296.
Statistical data on production, stocks and reserves, exports and imports, production capacities, and prices. (A4, B general)

25A. Economic Leadership and Raw Materials; There Is No Easy Road to Security. George S. Brady. *Ordnance,* v. 34, Jan.-Feb. 1950, p. 249-251.
The industrial materials problem of the U. S., particularly in the event of war. Recommends more emphasis on development of improved and radically different methods for utilization of domestic low-grade ores, for recovery of wastes, etc. (A4)

26A. Trends in Electrification of American Steel Industry. L. A. Umansky. *Transactions of the American Institute of Electrical Engineers,* v. 67, Part I, 1948, p. 784-795.
Generation and purchase of electric power, character of steel-mill load, frequency, system voltages, rolling-mill drives, auxiliary drives, and electric heating. 17 ref.
(A5, F23, ST)

27A. Aluminum Industries in India and Their Future Prospects. (In French.) *Journal du Four Electrique et des Industries Electrochimiques,* v. 58, Sept.-Oct. 1949, p. 107-108.
(A4, Al)

28A. Zinc Dust Collected by New System Installed at Pipe Galvanizing Plant. G. E. Brock and D. B. Shindler. *Steel,* v. 126, Jan. 16, 1950, p. 63.
(A8, L16, Zn)

29A. (Book) Metal Magic; the Story of the American Smelting & Refining Co. Isaac F. Marcosson. 313 pages. 1949. Farrar, Straus and Co., New York.
Presents history of past 50 years of above company woven with the humor and drama of mining, and close-ups of its fabulous figures. Company operations in various foreign areas.
(A2, B12)

30A. (Book) **Reports of the Iron and Steel Committee of the International Labor Organization.** 1949. International Labor Office, Washington Branch, 1825 Jefferson Place, N. W., Washington 6, D. C. $2.50.

Set of three books contains reports of the third session of the Iron and Steel Committee of the International Labor Organization, held in Geneva, Switzerland, in Nov. 1949. Report No. 1 is a general summary of the iron and steel industry; Report No. 2 deals with guaranteed wages in the industry; and Report No. 3 with technological improvements and their effects on employment. (A6, ST)

31-A. Where Will We Get Our Future Metals? John D. Morgan, Jr. *Metal Progress,* v. 57, Jan. 1950, p. 56-58.

The strategic metals problem of the U. S. Charts show U. S. imports, secondary recovery, and mine production of ores of Al, Co, Cu, Fe, Pb, Mn, Mo, Ni, Sn, W, V, and Zn for the years 1938-46 inclusive. (A4)

32-A. Beryllium Hazards. *Metal Progress,* v. 57, Jan. 1950, p. 98, 100, 102, 104. Condensed from *U. S. Atomic Energy Commission,* MDDC-1355.

Results of a survey of conditions existing in late 1946 in a plant manufacturing Be and Be-Cu alloys were correlated with medical history of the workers during 1943-46. 136 cases of Be poisoning were recorded. The processes, potential hazards, and health history of the various departments. (A7, Be)

33-A. Metalworking to Have Good Year in 1950. *American Machinist,* v. 94, Jan. 23, 1950, p. 109-124.

Annual appraisal of metalworking prospects. (A4)

34-A. American Machinist 37th Annual Review of Metalworking Equipment, Parts and Materials. *American Machinist,* v. 94, Jan. 23, 1950, p. 125-268.

Classified review of 1500 new products of interest to the metalworking industries. Includes machine tools and attachments; tools and accessories; forming, forging, casting; welding and heat treating; layout and inspection; cleaning and finishing; plant service equipment; and parts and materials. (A general)

35-A. Indonesian Tin: Outlook for One of the New Nation's Major Products. Leo S. Peak. *Foreign Commerce Weekly,* v. 38, Jan. 23, 1950, p. 6-9, 41-42.

Economic analysis and forecast. (A4, Sn)

36-A. Metals—Heavy and Light. *Light Metals,* v. 13, Jan. 1950, p. 13-16. From paper by J. W. Meier.

Broad economic and technological factors such as availability, properties, amenability to fabrication, etc. Tables show world production, prices, and physical properties of common metals. (A4)

37-A. Foote Converts Schoolhouse Into Research Laboratory. Howard C. E. Johnson. *Chemical Industries,* v. 66, Jan. 1950, p. 36-37.

Research facilities of Foote Mineral Co. Emphasis is on lesser-known metals such as lithium and zirconium. (A9, EG-b)

38-A. Outlook in 1950 Optimistic for Materials, Supplies and Prices. N. Bruce Bagger. *Materials & Methods,* v. 31, Jan. 1950, p. 47-50.

Economic data for 1949 plus forecasts for 1950, in general and for steel, copper, lead, aluminum, tin, zinc, and plastics. (A4)

39-A. Review of Materials Engineering Developments in 1949. *Materials & Methods,* v. 31, Jan. 1950, p. 69-80.

Covers irons and steels; nonferrous metals; nonmetallic materials; fabricated parts and forms; coatings and finishes; cleaning and finishing; heat treating; welding and joining; and shaping and forming. (A general)

40-A. Aluminum—Magnesium—Titanium. A Quick Look at What Happened in 1949. *Modern Metals,* v. 5, Jan. 1950, p. 13.

A brief survey of economic developments. (A4, Al, Mg, Ti)

41-A. Iron Ore Review for 1949. A. L. Fairley, Jr. *Blast Furnace and Steel Plant,* v. 38, Jan. 1950, p. 55-60.

Production data for the U. S. and Canada. (A4, Fe)

42-A. Requirements for Scrap and Pig Iron in 1949 at Prewar Level. Edwin C. Barringer. *Blast Furnace and Steel Plant,* v. 38, Jan. 1950, p. 61-62.

Economic summary. (A4, Fe)

43-A. Year's Steel Output Third Largest in Peacetime Despite Strike. Walter S. Tower. *Blast Furnace and Steel Plant,* v. 38, Jan. 1950, p. 62. (A4, ST)

44-A. Koppers Coke Oven Construction in North America in 1949. W. A. Leech, Jr. *Blast Furnace and Steel Plant,* v. 38, Jan. 1950, p. 65-66.

New installations. (A4)

45-A. Fontana Plant Increases Tonnage Output and Diversifies Products. William A. Green. *Blast Furnace and Steel Plant,* v. 38, Jan. 1950, p. 71-76.

Additional facilities include a second blast furnace, 45 coke ovens, a seventh openhearth, two soaking pits, a second slab furnace, an 86-in. hot-strip mill, and an electric-weld

pipe mill.
(A5, D general, F general)

46-A. Granite City Steel Co. Completes Strip and Tin Plate Mill Modernization. Charles Longenecker. *Blast Furnace and Steel Plant,* v. 38, Jan. 1950, p. 83-86.
Includes rolling, annealing, pickling, and coating.
(A5, F general, CN, Sn)

47-A. The Nickel Industry in 1949. Robert C. Stanley. *Canadian Chemistry and Process Industries,* v. 34, Jan. 1950, p. 59-60, 62.
An economic survey. (A4, Ni)

48-A. Economics of the Mineral Industry. Harry M. Crain, editor. *Quarterly of the Colorado School of Mines,* v. 45, Jan. 1950, 47 pages.
Papers presented Sept. 30, 1949, at Colorado School of Mines: "Mineral-Resource Appraisal by the U. S. Geological Survey", S. G. Lasky; "Oil and Human Welfare", Max W. Ball; and "Gold, Our Most Strategic Mineral", Donald H. McLaughlin.
(A4, B10, Au)

49-A. Tight Copper Supply Position Seen Likely Despite High Rate of Operations at Mines. C. Donald Dallas. *Metals,* v. 20, Jan. 1950, p. 6, 13.
Economic forecast. (A4, Cu)

50-A. The Lead Industry in 1949. Simon D. Strauss. *Metals,* v. 20, Jan. 1950, p. 7, 9-13.
Economic survey and forecast.
(A4, Pb)

51-A. Discussion on "The Disposal of Spent Acid Pickling Liquor". *Journal of the Iron and Steel Institute,* v. 164, Jan. 1950, p. 85-87.
Refers to paper by W. B. Wragge in June 1949 issue. See item 15-49, 1949. (A8)

52-A. The Disposal of Plating Shop Effluents. A. E. J. Pettet. *Journal of Electrodepositor's Technical Society,* v. 25, 1950, p. 1-16. (Preprint.)
Source and nature of waste waters, and their effect on streams and on disposal of sewage. Treatments for chromates, cyanides, salts of heavy metals, and acid conditions. 21 ref. (A8, L17)

53-A. Institute Research Projects. Charles M. Parker. *American Iron and Steel Institute,* "Technical Committee Activities", 1949, p. 16-101.
Research in general. Outlines projects sponsored by AISI, and publications listed under the appropriate material or process heading. Includes bibliography of published reports. (A9, Fe)

54-A. Stream Pollution and Waste Disposal. Richard D. Hoak. *American Iron and Steel Institute,* "Technical Committee Activities", 1949, p. 209-220.
Stream pollution by domestic and industrial sewage. Treatment and federal regulation. (A7, A8)

55-A. Metallurgical Aspects of Steel Manufacturing in the West. J. H. Shank. *American Iron and Steel Institute,* "Technical Committee Activities", 1949, p. 318-327.
Supply and properties of ore, coal supply, scrap, the water problem, liquid fuels, rolling mills, and marketing as related to the above industry. (A4, ST)

56-A. Ferrous and Non Ferrous Metals—Testing. *ASTM Bulletin,* Jan. 1950, p. 8-10.
Surveys ASTM activities of 1949. (A general)

57-A. Metals in Review. *Engineering and Mining Journal,* v. 151, Feb. 1950, p. 76-99.
Economic aspects, price and production data. "Gold", M. A. Kriz (p. 76-79); "Silver", Dickson H. Leavens (p. 80-82); "Copper", H. H. Wanders (p. 82); "Lead", Robert L. Ziegfeld (p. 84-85, 87); tables and graph of metal prices, 1897-1949 (p. 86); "Zinc", Charles R. Ince (p. 87-89); "Tin", H. H. Wanders (p. 89-90); "Light Metals" (aluminum and magnesium), Richard J. Lund (p. 90-92); "Minor Metals" (in general), Charles White Merrill (p. 93); "Cobalt", Hubert W. Davis (p. 93); "Antimony", Samuel A. Gustavson (p. 93-94); "Arsenic", Jack W. Clark (p. 94); "Cadmium", Richard H. Mote (p. 94); "Bismuth", Jack W. Clark (p. 94); "Mercury", Helena M. Meyer (p. 94-95); "Beryllium", Jack W. Clark (p. 95); "Platinum-Group Metals", Hubert W. Davis (p. 95-96); "Titanium", Helena M. Meyer (p. 96); "Ferro-Alloy Metals" (in general), Charles White Merrill (p. 97); "Manganese", Norwood B. Melcher (p. 97-98); "Tungsten", Hubert W. Davis (p. 98); "Chromite", Norwood B. Melcher (p. 98-99); "Molybdenum", Hubert W. Davis (p. 99); and "Nickel", Hubert W. Davis (p. 99). (A4)

58-A. Regeneration of Chromic Acid Solutions by Cation Exchange. Raymond L. Costa. *Industrial and Engineering Chemistry,* v. 42, Feb. 1950, p. 308-311.
Solutions that have been rendered useless by the accumulation of dissolved metals, such as Al, Cu, and Fe, are regenerated by passing through a cation-exchange resin. 10 ref. (A8)

59-A. Activities of the Steel Industry

in Abating Air Pollution. L. B. Patin. *Solid Fuel Engineer,* v. 9, Jan. 1950, p. 7-9.

Survey with special attention to the situation in Pittsburgh and Allegheny County, Pa. (A7, Fe)

60-A. Metallurgy: Publications by Members of the Staff of the National Bureau of Standards. *Bureau of Standards,* Letter Circular, LC964, Sept. 27, 1949, 28 pages.

List gives series, number, and price. Includes subject and author indexes. (A10)

61-A. Activities of the French Metallurgical Research Institute. (In French.) George Delbart. *Revue de Métallurgie,* v. 46, Nov. 1949, p. 775-778.

Activities of the above, known as I.S.R.I.D. A list of publications for 1948-49 is included. 24 ref. (A9)

62-A. The Organization of Iron and Steel Research in France. G. Delbart. *Metal Progress,* v. 57, Feb. 1950, p. 208-210.

See abstract from *Revue de Métallurgie,* item 61-A, 1950. (A9, Fe)

63-A. History of Premium Price Plan for Copper, Lead, and Zinc. 1942-47. H. E. Olund and S. A. Gustavson. *U. S. Bureau of Mines,* Information Circular 7536, Jan. 1950, 210 pages.

Includes charts and tables comparing costs and production data, and data on exploration premiums included in the Plan during the last year of its operation. (A4, Cu, Pb, Zn)

64-A. Bureau of Mines Strategic Minerals Development Program; Summary of Progress, 1939-1949. Lowell B. Moon. *U. S. Bureau of Mines,* Report of Investigations 4647, Jan. 1950, 62 pages.

Authority, objectives, funds, and procedure of the program. Data on resources, consumption, etc. Progress by commodities investigated. (A4, B10)

65-A. The Disposal of Spent Acid Pickling Liquor. I. Compositions and Various Methods Described. W. B. Wragge. *Wire Industry,* v. 17, Jan. 1950, p. 45-47, 49-50.

Economics and technology of disposal. Graphs, flow diagrams, and equilibrium diagrams for the $FeSO_4$-H_2SO_4-H_2O system. (To be continued.) (A8, L12)

66-A. (Book) **Repertorio delle Industrie Siderurgiche Italiane.** (Directory of Italian Iron and Steel Industries.) Associazione Industrie Siderurgiche Italiana (Italian Iron and Steel Federation), Piazza Rugabella N. 13, Milan, Italy. $5.50.

Reviews Italian firms engaged in primary and secondary production of iron and steel. Descriptions, dimensions, and quality of products manufactured by these concerns. Conversion tables of measures, along with an iron and steel dictionary in five languages. (A10, Fe)

67-A. Iron Ore. A. L. Fairley, Jr. *Mining Congress Journal,* v. 36, Feb. 1950, p. 59-63.

1949 economic developments. (A4, Fe)

68-A. Copper. Wide Fluctuations in Demand Experienced in 1949. E. O. Sowerwine. *Mining Congress Journal,* v. 36, Feb. 1950, p. 89-91, 96.

Economic developments of 1949. (A4, Cu)

69-A. Lead in '49. Charles R. Ince. *Mining Congress Journal,* v. 36, Feb. 1950, p. 92-93.

Economic developments. (A4, Pb)

70-A. Zinc in 1949. W. G. Woolf. *Mining Congress Journal,* v. 36, Feb. 1950, p. 94-96.

Economic developments. (A4, Zn)

71-A. The Strategic Metals Industry. *Mining Congress Journal,* v. 36, Feb. 1950, p. 107.

Domestic-production situation for Cr, Hg, Sb, W, and Mn. In each case, production has practically ceased, as a result of governmental actions. (A4, Cr, Hg, Sb, W, Mn)

72-A. Light Metals. Richard H. Mote and Horace F. Kurtz. *Mining Congress Journal,* v. 36, Feb. 1950, p. 111-113, 115.

1949 economic developments in Al, Mg, and Ti. (A4, Al, Mg, Ti)

73-A. Ferro-Alloys in 1949. Edwin K. Jenckes. *Mining Congress Journal,* v. 36, Feb. 1950, p. 116-118.

Surveys U. S. and foreign production of Cr, Mo, W, Mn, V, Ti, Co, Ni, Cb, and Ta. (A4, Fe-n)

74-A. Scrap Metals. Charles White Merrill, Norwood B. Melcher and Archie J. McDermid. *Mining Congress Journal,* v. 36, Feb. 1950, p. 123-124.

1949 production, prices, recovery, and consumption of ferrous and nonferrous scrap. (A8, A4)

75-A. Steel Mill Purifies Waste Water. William Czygan. *Iron Age,* v. 165, Feb. 23, 1950, p. 82-84.

New installation of Alan Wood Steel Co. (A8, ST)

76-A. Lead Output in 1949 Highest Since 1944. *Skillings' Mining Review,* v. 38, Feb. 25, 1950, p. 1.

Brief statistical survey of U.S. production. (A4, Pb)

77-A. Acid Iron Wastes Neutralization. Richard D. Hoak. *Sewage and Industrial Wastes,* v. 22, Feb. 1950, p. 212-221.

Various methods, neutralization agents, and equipment for neutralization of spent pickle liquor. (A8)

78-A. An Acid Iron Wastes Neutralization Plant. Rov F. Lab. *Sewage and Industrial Wastes,* v. 22, Feb. 1950, p. 222-223.

Plant of Copperweld Steel Co., Warren, Ohio. (A8)

79-A. Acid Wastes Treatment. Edward M. Jones. *Sewage and Industrial Wastes,* v. 22, Feb. 1950, p. 224-227.

Acid waste-treatment activities selected from some experiences of the Tennessee Copper Co. The wastes have their origin in the operations associated with the large-scale manufacture of H_2SO_4 from heavy sulfide ores. (A8, Cu)

80-A. Treatment of Cyanide Wastes From the Electroplating Industry. Arthur N. Corcoran. *Sewage and Industrial Wastes,* v. 22, Feb. 1950, p. 228-238.

Various methods derived from a variety of metallurgical operations. 20 ref. (A8)

81-A. The Utilization of Raw Material in the Ferrous Metallurgical Industry in the Union of South Africa. T. J. W. Jorden. *Engineering & Chemical Digest,* v. 2, Jan. 1950, p. 15-21.

Economic and technological trends, with particular reference to steelmaking. Includes production data. (A4, D general, Fe)

82-A. Range Production From Raw Material to Shipping Dock. Gerald Eldridge Stedman. *Finish,* v. 7, Mar. 1950, p. 33-38, 40-42, 69-71.

Tooling, fabrication, metal preparation, finishing, assembly, and packaging and shipping practices at A. J. Lindemann & Hoverson Co., Milwaukee. (A5, T10)

83-A. The Disposal of Spent Acid Pickling Liquor. II. Vacuum Evaporation. W. B. Wragge. *Wire Industry,* v. 17, Feb. 1950, p. 121, 124-126.

Equipment and procedures. 18 ref. (A8)

84-A. The Silver Situation. Pat McCarran. *Mining Congress Journal,* v. 36, Feb. 1950, p. 108-110.

Statistical data. The present economic situation and future prospects. (A4, Ag)

85-A. Waste-Disposal Studies by the American Electroplater's Society. C. Fred Gurnham. "Proceedings of the Fourth Industrial Waste Conference", *Purdue University,* Extension Series No. 68; *Engineering Bulletin,* v. 33, July 1949, p. 238-243.

Research program; accomplishments to date and plans for the future. (A8)

86-A. Methods of Disposing of Cyanide Wastes. R. L. Kessler and R. W. Oyler. "Proceedings of the Fourth Industrial Waste Conference", *Purdue University,* Extension Series No. 68; *Engineering Bulletin,* v. 33, July 1949, p. 244-249.

Program developed and used at General Motors' Delco-Remy Div. (A8)

87-A. Disposal of Waste Cyanides by Electrolytic Oxidation. R. W. Oyler. "Proceedings of the Fourth Industrial Waste Conference", *Purdue University,* Extension Series No. 68; *Engineering Bulletin,* v. 33, July 1949, p. 250-254.

Procedure used at the Guide Lamp Div., General Motors Corp. (A8)

88-A. Value of Canada's Mineral Production Reaches $890 Millions. H. McLeod. *Canadian Mining Journal,* v. 71, Feb. 1950, p. 62-71.

A statistical survey. (A4)

89-A. British Columbia in 1949. Fred H. Stephens. *Canadian Mining Journal,* v. 71, Feb. 1950, p. 72-80.

Statistical data on production of various minerals. (A4)

90-A. Review of Mineral Production: Saskatchewan. W. James Bichan. *Canadian Mining Journal,* v. 71, Feb. 1950, p. 90-92.

Statistical data. (A4)

91-A. Mining in Manitoba in 1949. J. P. de Wet. *Canadian Mining Journal,* v. 71, Feb. 1950, p. 93-97.

Statistical data on production of various minerals. (A4)

92-A. Ontario Annual Review. J. C. Browning. *Canadian Mining Journal,* v. 71, Feb. 1950, p. 98-105.

Surveys production of various minerals. (A4)

93-A. Quebec Annual Review. J. C. Browning. *Canadian Mining Journal,* v. 71, Feb. 1950, p. 106-112.

Surveys production of various minerals. (A4)

94-A. Treatment of Crude Phosphate in Molten Blast-Furnace Slag. (In German.) Wilhelm Wolf. *Stahl und Eisen,* v. 70, Jan. 5, 1950, p. 24-26.

An attempt was made to treat crude phosphate with molten slag and thus to convert the $Ca_3(PO_4)_2$ into a form soluble in soil acid. Successful results were obtained by blowing ground phosphate into a ladle filled with slag. (A8, Fe)

95-A. Recommendations on the Economic Utilization of Blast-Furnace Slag. (In German.) K. Peukert. *Metall,* v. 4, Feb. 1950, p. 55-57.

Estimates on the cost of extracting the metal contained in slags, the production of pigment oxides, and the conversion of slag into cement. (A8)

96-A. The Unit Processes of Chemical Metallurgy. R. Schuhmann, Jr. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Extractive Metallurgy Division), v. 182, 1949, p. 321-326; discussion, p. 326.

Previously abstracted from *Metals Technology*. See item 25a-42, 1948. (A3)

97-A. Review of Iron and Steel Literature for 1949. Morris Schrero. *Blast Furnace and Steel Plant*, v. 38, Mar. 1950, p. 341-342, 344-345, 350-352, 367, 378-379.

33rd annual review. (A10)

98-A. Production Line Methods Speed Output of Heavy Equipment. *Steel*, v. 126, Mar. 20, 1950, p. 82.

Equipment of Euclid Road Machinery Co. includes drill, shears, press brakes, and weld jigs. (A5, T4)

99-A. Long-Term Demand Will Force Metal Prices Up. William P. Shea. *Engineering and Mining Journal*, v. 151, Mar. 1950, p. 81-83.

World-wide economic analysis and forecast, backed by statistics. (A4)

100-A. Stream Pollution and the Plating Industry. C. Fred Gurnham. *Products Finishing*, v. 14, Mar. 1950, p. 26-28, 30, 32, 34, 36, 38, 40.

Economic, legal, and technological factors. (A8, L17)

101-A. Discussion on the Disposal of Plating Shop Effluents. *Journal of the Electrodepositors' Technical Society*, v. 25, 1950, p. 17-22. (Preprint.)

Discusses paper by A. E. J. Pettet. See item 52-A, 1950. (A8, L17)

102-A. Laboratories of the British Non-Ferrous Metals Research Association. *Engineering*, v. 169, Feb. 17, 1950, p. 179-180, 182.

(A9, EG-a)

103-A. (Book) **Seventh Semiannual Report of the Atomic Energy Commission.** 228 pages. Jan. 1950. U. S. Atomic Energy Commission, Washington, D. C.

Activities and developments during 1949 in production, military applications, reactor development, biology, medicine, finance, defense planning, education, organization, personnel, and security. Research in physical sciences and progress in atomic energy covering objectives, activities, application of results, management, and laboratories. (A general)

104-A. (Book) **Manufacturing Processes.** S. E. Rusinoff. 393 pages. 1949. American Technical Society, Drevel Ave. at 58th St., Chicago.

Materials, processes, and equipment. Covers sand molding, production of sand castings, other casting processes, hot and cold forming, joining processes, heat treatment, powder metallurgy, plastics, and plastic molding.

(A5, E general, F general, G general, H general, J general, K general)

105-A. (Book) **The Physico-Chemical Principles of Metallurgy.** (In German.) W. Baukloh. 300 pages. 1949. Akademie-Verlag, Berlin, Germany. 20 marks.

Scans almost the whole of metallurgical knowledge and manages to build quite heterogeneous and seemingly unrelated subjects into one well-integrated picture. Theoretical principles are given first place, but examples of the direct practical application of the principle in question are always provided. Atomic theory is dealt with only rather superficially. (From review in *Metal Treatment and Drop Forging*.) (A general)

106-A. Ship 70,991,490 Gross Tons Lake Superior Iron Ore in 1949. *Skillings' Mining Review*, v. 38, Mar. 25, 1950, p. 1-2.

Tabulation broken down by ranges, type of treatment, and individual mines. (A4, Fe)

107-A. Closing Research - Manufacturing Gap Brings About Major Production Economies. R. J. Emmert. *Steel*, v. 126, Mar. 27, 1950, p. 66-70, 94.

By applying scientific knowledge involving all phases of engineering, General Motors' process development section helps the company's various divisions to effect spectacular improvements in manufacturing efficiency. Cut-wire shot peening and shot blasting, welding nuts to sheet metal, tub method of polishing and buffing, and new painting techniques are a few of the projects which have paid off in lower costs.

(A5, G23, K13, L10, L26)

108-A. Control of Atmospheric Beryllium. Norman P. Pinto. *Metal Progress*, v. 57, Mar. 1950, p. 345-347, 382, 384, 386, 388, 390, 392.

Equipment and procedures for safeguarding health of workers engaged in processing of beryllium. (A7, Be)

109-A. Cutting Costs by Planning Tool Manufacture. George S. Clarke. *Iron Age*, v. 165, Mar. 30, 1950, p. 104-106.

Miscellaneous design and production tips, including weld repair. (A5, G general, T5)

110-A. Los Angeles Foundrymen Test Air Pollution Control Equipment. T. L. Harsell, Jr. *Western Metals*, v. 8, Mar. 1950, p. 25-27.

Detailed analysis of methods and results. (A7, E general)

111-A. Repcal Brass Installs Unique Fume Control System. *Western Metals*.

v. 8, Mar. 1950, p. 32-33.
Applied to brass-smelting furnaces. (A7, C21, Cu)

112-A. Air Pollution Control Equipment in Use in Western Plants. *Western Metals*, v. 8, Mar. 1950, p. 34-37.
Lists concerns selling dust and fume-abatement equipment to western metalworking industry. Brief descriptions of the equipment sold by each company. (A7)

113-A. Devalued Foreign Currencies Used as Trade Weapon to Undersell Metals Produced in U. S. Felix E. Wormser. *Metals*, v. 20, Mar. 1950, p. 6-7, 9-10.
Urges domestic mining industry to ask Congress for protection against unfair competition by foreign producers of lead and zinc. (A4, Pb, Zn)

114-A. ECA Activities Have Important Bearing on Mining Industry in Western Hemisphere. C. H. Burgess. *Metals*, v. 20, Mar. 1950, p. 12-13.
Agency's funds are used to buy 21,000 tons of copper, 8,000 tons of lead, 11,000 tons of zinc, and 13,500 tons of aluminum each month. Economic effects. (A4, Cu, Pb, Zn, Al)

115-A. Character of Waste Oil Emulsions. David Milne. *Sewage and Industrial Wastes*, v. 22, Mar. 1950, p. 326-330.
Some factors to be considered in the breakdown of emulsions from metal-cutting operations. (A8, G21)

116-A. Extended Use of Oil Emulsions To Minimize Disposal Problems. M. A. Pratt. *Sewage and Industrial Wastes*, v. 22, Mar. 1950, p. 331-335.
Reconditioning of grinding coolants in a central system. (A8, G21)

117-A. Research and Development; A Survey of the New Rubery Owen and Co., Ltd., Test Plant for Automotive Components. *Automobile Engineer*, v. 40, Mar. 1950, p. 87-92.
Research and testing facilities of new British plant. (A9)

118-A. British Steel; Some Post-War Developments. *Metallurgia*, v. 41, Feb. 1950, p. 181-190.
Developments in modernization, enlargement of facilities, and effective use of plants, for main producing areas. (A5, A4, ST)

119-A. Progress of the Aluminium Industry. Post-War Production Activities. *Metallurgia*, v. 41, Feb. 1950, p. 199-203.
General development of the industry in Britain. Describes major developments during the war and post-war extension schemes. (A4, Al)

120-A. Research on a New Cell for Recovery of Silver From the Electrolytic Bath by Regeneration of the Bath. (In Italian.) Luigi Fracchia. *Metallurgia Italiana*, v. 41, Nov.-Dec. 1949, p. 287-291.
Critically reviews existing methods. Proposes use of a new type of diaphragm cell. Method of operation, optimum conditions, and economical aspects of this method. (A8, L17, Ag)

121-A. Industrial Research Foundations. Haldon A. Leedy and Francis W. Godwin. *Physics Today*, v. 3, Apr. 1950, p. 14-19.
Details concerning the larger organizations of this type in the U. S. (A9)

122-A. Saving Money With Tool Salvage and Repair. Joseph Corney. *Production Engineering & Management*, v. 25, Apr. 1950, p. 51-53.
How Kaiser-Frazer uses tool salvage programs to cut production costs. Welding plays a leading role. (A8, K general, T6)

123-A. "Automation"—A Magic Word Which May Spell Lower Production Costs for You. A. H. Allen. *Steel*, v. 126, Apr. 3, 1950, p. 102-104, 106, 108.
Automation is defined as the automatic movement of parts between processing operations, synchronizing such movement with the production line. Tells how Ford saves up to 20% permitting equipment write-offs in 3 to 12 mo. by use of automation. (A5)

124-A. Automation in Forging and Heat Treating. Thomas E. Darnton and Willard L. Mantz. *Tool Engineer*, v. 24, Apr. 1950, p. C30-C31.
At Oldsmobile's forge plant. (A5, F22, J general, CN)

125-A. The Work of the Department of Engineering and Metallurgy, Ontario Research Foundation. O. W. Ellis, P. E. Cavanagh, and L. A. Usher. *Canadian Mining and Metallurgical Bulletin*, v. 43, Mar. 1950; *Transactions of the Canadian Institute of Mining and Metallurgy*, v. 53, 1950, p. 161-173.
Facilities and research programs. 12 ref. (A9)

126-A. European Research in Physical Metallurgy. B. D. Cullity. *Journal of Metals*, v. 188, Apr. 1950, p. 648-650.
A survey based on two years spent in Europe, the first in metallurgical research at the Ecole des Mines in Paris and the latter in scientific liaison for the London branch of the U. S. Navy's Office of Naval Research. Limited to Western Europe and to basic, rather than applied, research. (A9, N general)

127-A. Acid Conditioning of Metallurgical Smoke for Cottrell Precipitation. A. L. Labbe. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 188, Apr. 1950, p. 692-693.

Describes author's experience in operation of an early Cottrell installation which led to development of a sulfuric acid fuming furnace for auxiliary acid conditioning of combined Wedge-roaster and lead-sinter smoke. (A8, B15, Pb)

128-A. Small Steel Mills for Local Markets. H. W. McQuaid. *Iron Age*, v. 165, Apr. 6, 1950, p. 90-94.

Economic factors involved in erection of small plants in areas now remote from the mills. It is claimed that electric furnaces, making carbon bar and flat-rolled products, plus fast continuous mills, permit steel costs as low as those of large integrated plants. Selection of type of mill. (A4, D general, ST)

129-A. Current Research in Physical Metallurgy. Earl R. Parker. *Quarterly of the Colorado School of Mines*, v. 45, June 1950, p. 31-36; discussion, p. 36-38.

Differences between applied and basic metallurgical research. Outlines a number of unsolved problems in each field. (A9)

130-A. Development of Improved Metals to Determine Success of Atomic Energy Program. *Steel*, v. 126, Apr. 10, 1950, p. 91-92, 94, 97. Based on Seventh Semiannual Report, U. S. Atomic Energy Commission, Jan. 1950.

Strength of metals, diffusion in solid metals, thermodynamic research, corrosion, and effects of radiation are among AEC's basic research projects outlined. (A9)

131-A. The British Non-Ferrous Metals Research Association; Increased Laboratory Capacity. *Metallurgia*, v. 41, Mar. 1950, p. 263-266.

(A9, SG-a)

132-A. The Iron and Steel Industry in India. E. V. Parkinson. *Engineering*, v. 169, Mar. 17, 1950, p. 311-312; Mar. 24, p. 336-337. A condensation.

(A4, Fe, ST)

133-A. AISI—Progressive Spearhead of the Iron and Steel Industry. *Standardization*, v. 21, Apr. 1950, p. 90-92, 107.

Organization and activities of American Iron and Steel Institute. (A9, S22, Fe)

134-A. Steel Profits—Drop Little Despite Strike. *Iron Age*, v. 165, Apr. 13, 1950, p. 106 + insert.

Includes folded table giving financial analysis of the steel industry for 1948 and 1949. The data cover 26 companies representing 92% of U. S. ingot capacity. (A4, ST)

135-A. The Influence of Osmond on the Development of the Physical Metallurgy of Steel. G. B. Willey. *Sheet Metal Industries*, v. 27, Mar. 1950, p. 211-217, 220; Apr. 1950, p. 311-322.

Detailed analysis of the work of Floris Osmond and other metallurgical pioneers. 43 ref. (A2, ST)

136-A. Treatment of Waste Waters From the Pickling of Steel. G. E. Eden and G. A. Truesdale. *Journal of the Iron and Steel Institute*, v. 164, Mar. 1950, p. 281-284.

Experiments of Gehm on neutralization of dilute solutions of H_2SO_4 by application in upward flow to a bed of limestone grit were extended to show that the limiting concentration of acid that can be satisfactorily neutralized is dependent on temperature of solution. The method would have the advantage that large volumes of waste water could be treated in a comparatively small plant. (A8, L12, ST)

137-A. (Book) **Metallurgy.** 60 pages. Colorado School of Mines, Department of Publications, Golden, Colo. *Quarterly* of the Colorado School of Mines, No. 3A, v. 45, June 1950. $0.50.

Papers presented at conference on metallurgy during the 75th Anniversary meetings on "Mineral Resources in World Affairs". Individual papers are abstracted separately. (A9, B14, T28)

138-A. (Book) **Disposal of Plating Room Wastes.** B. F. Dodge and D. C. Reams. American Electroplaters' Society, Jenkintown, Pa. AES Research Report No. 14, 1950. 48 pages. $1.00.

Critical review is part of an investigation into the general field of plating room waste disposal. Many references. Includes the effects of cyanide wastes on streams and sewage treatment plants. (A8, L17)

139-A. (Book) **Review of Current Research and Directory of Member Institutions.** 186 pages. 1949. Engineering College Research Council, College of Engineering, State University of Iowa, Iowa City, Iowa. $1.75.

Over 4000 current college and university research projects in engineering subjects are listed by title. Entries from 82 educational institutions describe administrative policies for conducting engineering research and list responsible personnel, research expenditures, short courses, and conferences of special interest; also titles of all engineering research studies currently active at each institution. Includes a breakdown of

research projects according to engineering departments involved, and a subject index. (A9)

140-A. (Book) Engineers' Dictionary, Spanish-English and English-Spanish. Ed. 2. Louis A. Robb. 664 pages. 1949. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. $12.50.

Contains over 75,000 terms used in everyday practice by civil, mechanical, and electrical engineers—an increase of 70% over the previous edition. The modern vocabularies of mining, shipbuilding, logging, sugar milling, petroleum production, airport construction, metallurgy, radio, and chemistry are also included. (A10)

141-A. Operating Economies Aid Steel Earnings. *Steel,* v. 126, Apr. 24, 1950, insert between p. 52 and 53.

25th Annual Financial Analysis of the Steel Industry presents tabular data for 29 leading companies representing slightly more than 92% of U. S. ingot capacity. (A4, ST)

142-A. 1948-49 Marked by 62% Expansion of Chemical Research at Armour Foundation. *Chemical and Engineering News,* v. 28, Apr. 24, 1950, p. 1367-1371.

Outlines research projects in a variety of fields. (A9)

143-A. UC's Growing Metallurgical Research Serves Industry *Western Metals,* v 8, Apr. 1950, p. 31-32.

Research at University of California. (A9)

144-A. Economic Considerations in Producing Magnesium-Containing Iron. Donald J. Reese. *Foundry,* v. 78, May 1950, p. 120-125.

Production costs, applicable raw materials, and specifications for ductile or nodular cast iron. Typical applications. (A4, S22, CI)

145-A. Zinc Industry Facing Critical Condition Due to Insufficiency of Concentrates. Howard I. Young. *Metals,* v. 20, Apr. 1950, p. 6-7, 12.

Survey of supply situation. (A4, Zn)

146-A. Impact of Devaluation on Nonferrous Metals. Simon Strauss. *Metals,* v. 20, Apr. 1950, p. 13, 15-16. (A4, SG-a)

147-A. U. S. Supplies of Strategic Manganese Show Upward Trend in 1949. Louis A. Cassara. *Foreign Commerce Weekly,* v. 39, May 1, 1950, p. 6-7, 39-40.

Economic survey shows loss of U.S.S.R. source to be offset by gains in other areas. (A4, B10, Mn)

148-A. Commentary: Scientific Research in Industry. P. Chevenard. *Research,* v. 3, Apr. 1950, p. 149-153.

French scientist discusses fundamental and applied research, indicating value of industrial research in which the researchers are allowed considerable freedom to explore seemingly unprofitable bypaths. Illustrates value of such investigations by the story of the development of an alloy resistant to corrosion cracking in steam at elevated temperatures. (A9)

149-A. Rank of L.S. Iron Ore Producers in 1949. *Skillings' Mining Review,* v. 39, Apr. 22, 1950, p. 1-2.

Tabulates shipments from individual mines of 26 Lake Superior operating companies. (A4, Fe)

150-A. Whither Metallurgy? James White. *Refractories Journal,* v. 26, Mar. 1950, p. 75-82.

Present status and future prospects in the application of theoretical physics to metallurgy. (A9)

151-A. 1949 Output of Lead and Zinc in Arizona Made New State Record. *Skillings' Mining Review,* v. 39, Apr. 29, 1950, p. 1.

Statistics. (A4, Pb, Zn)

152-A. The Calbeck Process for Refining Zinc Oxide. John H. Calbeck, William T. Maidens, and Oscar J. Hassel. *Journal of Metals,* v. 188, May 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 757-763.

Rotary gas-fired reheating furnace used by American Zinc Oxide Co. at Columbus, Ohio for refining lead-free zinc oxide. Outstanding features are that the color of the ZnO is greatly improved, S is eliminated, and Cd is recovered without densifying the product to an objectionable degree. (A8, C21, Cd)

153-A. Treatment of Electrolytic Copper Refinery Slimes. J. H. Schloen and E. M. Elkin. *Journal of Metals,* v. 188, May 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 764-777.

Known methods for treatment of anode mud or slimes, for recovery of precious metals and other by-products. The processes used by five copper refineries and their flowsheets. The slimes contain varying quantities of Cu, Ag, Au, S, Se, Te, Pb, As, Sb, Ni, Fe, SiO_2. Products recovered are Se, Te, Au, Ag, Pt-group metals, and sometimes Pb. 50 ref.
(A8, C28, Cu, Se, Te, Ag, Au, EG-c)

154-A. Modern Baghouse Practice for the Recovery of Metallurgical

Fumes. A. L. Labbe and J. J. Donoso. *Journal of Metals,* v. 188, May 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 792-796.

Principles governing bag filtration and factors most directly affecting bag life. Methods for temperature conditioning of smoke previous to filtering, and the evolution of bag-shaking mechanisms. Application is mainly to the lead smelter and nonferrous blast furnace. Miscellaneous oxides are recovered. (A8, C21, Pb)

155-A. Europe Will Need Metals From Western Hemisphere. R. L. Wilcox. *Engineering and Mining Journal,* v. 151, May 1950, p. 88-90.

Economic survey and prediction of future European needs for imported nonferrous metals, a vital factor in future prices. (A4, EG-a)

156-A. Auto Industry Takes More Steel. *Steel,* v. 126, May 15, 1950, p. 60-61.

Tables and graphs show tonnage amounts and percentage distributions of steel in 1949 among various principal products. Includes distributions for alloy and stainless steels. (A4, T21, ST)

157-A. The Electrification of Metal Dusts. A. R. Boyle and F. J. Llewellyn. *Journal of the Society of Chemical Industry,* v. 69, Feb. 1950, p. 45-49.

Static electrification of a number of metal dusts was measured in two standard experiments; these results, together with the electrostatic energy required for the ignition of dust clouds of metal powders, provide a basis for estimation of the electrostatic hazard likely to be encountered in handling quantities of such materials. (A7)

158-A. Safety Procedures for Protection Against Flammable Atmosphere Hazards of Special Atmosphere Furnaces: I. J. B. Smith. *Industrial Heating,* v. 17, Apr. 1950, p. 592-596, 598, 600, 743.

Detailed procedures, including flammability-limit graphs, and diagrams showing layout and circuits of control systems. (To be continued.) (A7, J2)

159-A. National Supply Spends $25 Million for New Equipment. *Iron Age,* v. 165, May 11, 1950, p. 70-71.

Includes furnaces, pipe straighteners, heat treating, hot milling, machining, and testing equipment, used in manufacture of pipe and tubular products and oil-field equipment. (A5, ST)

160-A. A Process for the Recovery of Gold From Activated Carbon by Leaching and Electrolysis. J. B. Zadra. *U. S. Bureau of Mines,* Report of Investigations 4672, Apr. 1950, 47 pages.

Describes process for extracting Au from Au-laden carbon and reuse of the de-adsorbed carbon. Process consists of leaching with a caustic sodium sulfide solution and recovering the Au by electrolysis. 46 ref. (A8, Au)

161-A. 30th Annual Report, 1950, 61 pages. *British Non-Ferrous Metals Research Association,* Euston St., London, N.W. 1, England.

Presents a general report. Reviews research in 1949-50 on Cu, Ni, Al, Mg, Pb, Sn, their alloys, Zn, and galvanizing. Includes photographs of metallurgical laboratories and lists of reports and translations. (A9, EG-a)

162-A. (Book) **Manufacturing Analysis.** Richard F. Kipers. 452 pages. McGraw-Hill Book Co., 330 West 42nd St., New York 18, $5.00.

Describes major manufacturing processes of metalworking, explaining their basic principles, their fundamental tooling, their production capabilities and limitations, and the problem of estimating production on each. Chapters on forgings, die casting, plastic molding, welding, press work, sawing, planing, and shaping, milling, broaching, turning, grinding, thread-forming, surface finish, inspection, materials handling, assembling, tooling costs, analysis of operations, and tolerance balancing. (A5)

163-A. (Book) **Métallurgie.** (Metallurgy). Ed. 63. R. Cazaud. 349 pages. 1949. Dunod, 92 rue Bonaparte, Paris 6, France.

A brief handbook giving condensed information concerning all phases of theoretical and applied metallurgy. (A general)

164-A. How To Find Detailed Information When You Want It. A. H. Geisler. *Metal Progress,* v. 57, May 1950, p. 613-617.

Complete classification of the metallurgical field devised by a committee sponsored by ASM and Special Libraries Assoc. Details of improved punched card, especially designed for use with the system. (The code now shown at the end of all abstracts in "A.S.M. Review of Metal Literature" is intended for use in connection with this system.) (A general)

165-A. How Hotpoint Fabricates Dishwasher Baskets From Stainless Steel Wire. Erle F. Ross. *Steel,* v.

126, May 22, 1950, p. 77-79.
Cutting, forming, resistance welding, and electropolishing equipment and procedures. (A5, G general, K3, L13, T10, SS)

166-A. Dental Research. *Technical News Bulletin* (National Bureau of Standards), v. 34, May 1950, p. 64-67.
Review. Includes studies of dental amalgam alloys, gold alloys, silicate cements, denture resins, and of the structure of enamel and dentin. (T10, Au)

167-A. Fire Protection Precautions for Uranium Scrap and Powder. Edward J. Kehoe, Francis L. Brannigan, and Merril Eisenbud. *Nucleonics,* v. 6, May 1950, p. 34-37.
Fire properties of uranium scrap with emphasis on its pyrophoricity. Safe procedures for storage, handling, disposal, and shipment. ICC rules for common-carrier shipment. Effects of various extinguishing agents on burning uranium scrap. (A7, U)

168-A. Conveyors Speed Gas Tank Assembly. W. G. Patton. *Iron Age,* v. 165, May 25, 1950, p. 82-84.
Mechanical handling, welding and soldering equipment and procedures at Oldsmobile's assembly plant. (A5, K3, K7, T21, CN)

169-A. Research From the Standpoint of the Smaller Business Enterprise. G. H. Clamer. *Journal of the Franklin Institute,* v. 249, May 1950, p. 367-391.
Consists largely of six case histories from the author's experiences with Ajax Metal Co. over the past 50 years. (A9)

170-A. Metallurgical Research at Georgia Tech. R. J. Raudebaugh. *Research Engineer* (Georgia Institute of Technology), v. 1, May 1950, p. 3-4, 13-16.
Surveys equipment and outlines some of the projects. (A9)

171-A. Ore To Finished Product; Researches of Dominion Bureau of Mines. W. M. Bonham. *Canadian Mining Journal,* v. 71, May 1950, p. 67-71.
Facilities and research activities. (A9)

172-A. Minerals of the Belgian Congo. *Chemical Age,* v. 62, May 6, 1950, p. 687.
Tables give production data for 1946, 1947, and 1948. (A4)

173-A. Research on Nickel and Its Alloys. *Metal Treatment and Drop Forging,* v. 17, Spring 1950, p. 29-34.
Research in the British nickel industry as carried out at the Birmingham Laboratories of Mond Nickel Co., Ltd. (A9, Ni)

174-A. An Accounting of World Mining for 1949. Charles Will Wright. *Mining World,* v. 12, Apr. 15, 1950, p. 19, 21-24, 26.
An economic survey, (A4, B12)

175-A. Metals and Minerals Review. *Mining World,* v. 12, Apr. 15, 1950, p. 27, 30-32, 35, 37-38, 41, 43, 45.
Economic survey consists of the following brief articles: "Aluminum", Donald M. White; "Antimony", Worthen Bradley; "Arsenic" (anon.); "The Atom", Raw Materials Operations Staff, Atomic Energy Commission; "Bismuth" (anon.); "Cadmium" (anon.); "Copper", Charles H. Winship, Jr.; "Fluorspar", Hugh E. McCray; "Gold", Joseph Stagg Lawrence; "Iron", A. L. Fairley, Jr.; "Lead", Felix E. Wormser; "Magnesium", W. S. Loose; "Molybdenum", C. M. Loeb, Jr.; "Nickel", Robert C. Stanley; "Phosphates", Louis Ware; "Potash", J. W. Turrentine; "Platinum", Charles Englehard; "Silver", Roger O. Oscarson; "Titanium", Joseph H. Reid; "Tin", Robert J. Nekervis; "Tungsten", Worthen Bradley; "Vanadium", Blair Burwell; and "Zinc", E. H. Snyder. (A4)

176-A. Now Radiators! R. J. Reardon. *Western Machinery and Steel World,* v. 41, May 1950, p. 88-89.
Forming, finishing, shearing, joining, and other miscellaneous fabrication procedures in manufacture of radiators for Ford Motor Co. by Modine Mfg. Co., Whittier, Calif. (A5, G general, T21)

177-A. The Current World Zinc Situation. R. L. Wilcox. *Metals,* v. 20, May 1950, p. 8-12.
Includes tabular and graphical data. (A4, Zn)

178-A. Quick Counterattack Urged by Steel Leaders. *Iron Age,* v. 165, June 1, 1950, p. 81-84.
Reviews papers and talks on political, economic, and technological aspects of the iron and steel industry presented at 58th General Meeting of AISI in New York City. (A general, ST)

179-A. How To Dispose of Acid Wastes. J. E. Cooper. *Chemical Industries,* v. 66, May 1950, p. 684-685.
Practical methods. 12 ref. (A8)

180-A. Research and Results at Mellon Institute, 1949-50. *Chemical and Engineering News,* v. 28, May 29, 1950, p. 1810-1815.
A review based upon contents of the 37th annual report of the director. (A9)

181-A. From a Metallurgist's Notebook: Lead Contamination. H. H. Sy-

monds. *Metal Industry,* v. 76, May 19, 1950, p. 405-406.

Some whisky was found to contain a lethal quantity of lead. Tests were carried out on the whisky as received and on the residue found after it had been left standing in a copper flask. It was concluded that the lead was picked up from the solder in the seams and the tin coating of the inside of the flask. (A7, R7, Pb, Cu)

182-A. Recovery of Manganese Slags for the Production of High-Percentage Ferromanganese by Melting Specular Iron. (In German.) Theodor Kootz and Jakob Willems. *Stahl und Eisen,* v. 70, Apr. 27, 1950, p. 360-369.

Most suitable melting conditions and procedures were experimentally investigated, the literature being also reviewed. 13 ref. (A8, B21, Fe-n, Mn)

183-A. Remelting and Refining of Bearing Metal Scrap. (In German.) Th. Meissl. *Chemische Technik,* v. 1, Dec. 1949, p. 182-183. (A8, C21, SG-c)

184-A. Flammable Atmosphere Hazards of Special Atmosphere Furnaces. J. B. Smith. *Industrial Gas,* v. 28, May 1950, p. 7-9, 19-21. (A condensation.)

See abstract of "Safety Procedures for Protection Against Flammable Atmosphere Hazards of Special Atmosphere Furnaces", *Industrial Heating,* items 158-A and 139-J, 1950. (A7, J2)

185-A. Some Aspects of the Mineral Position of Eight Principal Industrial Nations. E. Willard Miller. *Mineral Industries Experiment Station, Pennsylvania State College,* Technical Paper 165, 1950, p. 133-143. Reprinted from *Economic Geography,* v. 26, No. 2, Apr. 1950.

Covers coal, petroleum, iron ore, pig iron, copper, lead, zinc, bauxite, and aluminum. 17 ref. (A4, Fe, Cu, Pb, Zn, Al)

186-A. (Book) **A History of Steel Casting.** Arthur D. Graeff, Editor. 168 pages. 1949. Steel Founders' Society of America, 920 Midland Bldg., Cleveland 15, Ohio. $2.50.

General history, history along the Delaware, individual companies, human interest stories of founders, and some of the leaders in the industry. (A2, CI)

187-A. (Book) **The Story of Steel.** Max Davies. 96 pages. Burke Publishing Co., London, England.

Written for the layman; mainly historical, but includes modern manufacturing methods. Chapters are devoted to raw materials, openhearth furnace, bessemer converter, electrical and crucible steelmaking, and shaping and treating of steel. (A2, D general, ST)

188-A. Review of the Metals and Minerals. *Mining Journal.* (Annual Review Number), May 1950, p. 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25-29, 31, 33.

Economic survey includes the following: "Gold", E. Baliol Scott; "Silver" (anon.); "Platinum Metals" (anon.); "Copper" and "Tin", E. Baliol Scott; "London Metal Market" (anon.); "Lead" and "Zinc", E. Baliol Scott; "Magnesium", Ralph F. Batty; "Aluminium", Cyril S. Fox; "Nickel" (anon.); "Beryllium", Ralph F. Batty; "Titanium" (anon.); "Manganese", Cyril Fox; "Wolfram, Molybdenum, and Vanadium", Ralph F. Batty; and "Iron and Steel Trade" (anon.) (A4)

189-A. Reclamation of Small Accumulations of Nickel and Cobalt. C. C. Downie. *Mining Journal,* v. 234, June 9, 1950, p. 598-599.

Recommended recovery procedures for the scrap-metal refining plant. (A8, Co, Ni)

190-A. Integrated Operations for Production of Diverse Products. *Production Engineering & Management,* v. 25, June 1950, p. 63-70.

Manufacture of washing-machine tubs. Includes shearing, deep drawing, annealing, forming, enameling, and inspection. (A5, G general, T10, CN)

191-A. The Organization of Iron and Steel Research in Russia. *Metal Progress,* v. 57, June 1950, p. 772-773. From an article by G. Delbart, *Revue de Métallurgie.*

Quotes from Delbart's article (see item 25A-137, 1949) are followed by editorial remarks concerning the publication of Russian metallurgical papers. Includes analysis of Russian publications surveyed in ASM Review of Metal Literature. (A9, Fe, ST)

192-A. Welding Products Reference Number. *Welding Engineer,* v. 35, Mid-June 1950, 116 pages.

Statistical section, buyers' guide, and trade-name section. (A10, K general)

193-A. Should Zinc Enter the U. S. Duty Free? *Metals,* v. 20, June 1950, p. 8-12.

Debate in print. Affirmative is argued by Norman Hickman of American Metal Co., Ltd.; negative by Ernest V. Gent, American Zinc Institute. (A4, Zn)

194-A. Cleaning of Stack Gases From Calcining and Melting Opera-

tions. John M. Kane. *Chemical Engineering,* v. 57, June 1950, p. 269-270.
Discusses various methods.
(A8, B15, C21)

195-A. Steel: Slag and Pickle Liquor Get Together. S. S. Heide. *Chemical Engineering,* v. 57, June 1950, p. 286.
New process in which molten blast-furnace slag poured into the waste pickle liquor evaporates water, neutralizes acidity, granulates the slag, and produces a porous product which can be dried, crushed, and used to reduce the acidity of raw commercial fertilizer mixtures and prevent caking. (A8, ST)

196-A. Strategic and Critical Minerals; The U. S. Stockpile Program. John D. Morgan, Jr. *Canadian Mining Journal,* v. 71, June 1950, p. 51-54.
(A4)

197-A. Metalworking: What It's Doing—What To Expect. *Steel,* v. 127, July 3, 1950, p. 53-60.
A statistical report and forecast.
(A4)

198-A. Electrolytic Dissolution of Copper in Ammoniacal Electrolytes. Fred A. Schimmel. *Journal of Physical & Colloid Chemistry,* v. 54, June 1950, p. 841-847.
It is known that copper can be dissolved electrolytically in ammoniacal electrolytes. A process has been used recently for the recovery of copper from copper-plated iron scrap. Conditions under which copper can be dissolved anodically in the cuprous form and also deposited cathodically from the monovalent state using an ammoniacal electrolyte. (A8, L17, Cu)

199-A. A Survey of the Aluminum Industry in Post-War Germany. B. M. Pearson. *Light Metal Age,* v. 8, June 1950, p. 15-16. Based on article in *Revue de l'Aluminum.*
(A4, Al)

200-A. Mechanization of Technical Processes in Ferrous Metallurgy. (In Russian.) A. B. Chelyustkin and B. A. Levitanskii. *Promyshlemnaya Energetika* (Industrial Power), v. 7, Mar. 1950, p. 3-6.
Progress to date in mechanization of rolling mills and other operations connected with ferrous metallurgy. (A5, F23, Fe)

201-A. Reducing the Generation of Waste: A Cost-Cutting Technique. W. E. Casey. *General Electric Review,* v. 53, July 1950, p. 13-17.
Various aspects as applied to industrial production. Includes standardization, effective planning, improved technique, conservation of valuable materials, discriminating purchase, and scrap disposal. Illustrated by examples of inefficient and efficient layout for punch-press operation. (A8, G2)

202-A. Air Pollution—A Major Problem for Industry. Pollution. Henry F. Hebley. **Stack Sampling.** Leslie Silverman. *Iron Age,* v. 166, July 13, 1950, p. 84-89.
Companion articles are abstracts of papers given before the First National Air Pollution Symposium, Pasadena, Calif., Nov. 10-11, 1949. A table compares devices used for stack, effluent, and aerosol sampling. 40 ref. (A7)

203-A. Bethlehem Embarks on Major Modernization Program at Johnstown Plant. Arthur B. Homer. *Iron and Steel Engineer,* v. 27, July 1950, p. 132, 134.
(A5, D general, ST)

204-A. Blast-Furnace Slag as Filler for Concrete. (In German.) Alfred Schneider-Arnoldi. *Stahl und Eisen,* v. 70, May 25, 1950, p. 464-465.
Blast furnace slags are excellent fillers for concrete, especially used in the building of homes. Such concretes combine light weight with high insulating properties.
(A8, D1)

205-A. Liquation of Iron and Manganese From Aluminum-Alloy Scrap. (In German.) A. Buckeley. *Metall,* v. 4, June 1950, p. 235-239.
Combines a review of the literature with results of experiments, showing that the Fe content in Al alloy scrap can be reduced to a tolerable amount by addition of Si, Cu, Zn, or Mn to the melts. The complete and the partial refining of scrap Al alloys. 28 ref. (A8, Al)

206-A. (Book) **Engineering Metallurgy.** Alexander P. Gwiazdowski. 246 pages. C. C. Nelson Publishing Co., Appleton, Wis. $4.
Short items on a wide variety of subjects; might be considered a handbook treatment. Can be used for selection of materials and heat treatments and writing engineering specifications. Chapters on such topics as: Static and dynamic properties of metals, applications of SAE steels, heat treatment of ferrous materials, tool materials, processing of rolled steels, castings, and bearing metals. (A general)

207-A. (Book) **The Organization of Industrial Scientific Research.** Ed. 2. C. E. Kenneth Mees and John A. Leermakers. 383 pages. 1950. McGraw-Hill Book Co., 330 West 42nd St., New York 18.

First edition was published in 1920; present text is an essentially new book. History and development of industrial scientific research, the general principles of its conduct, and an analysis of methods actually used for the organization and operation of industrial research laboratories. Experience of the authors has been chiefly in the fields of chemistry and physics. (A9)

208-A. (Book) **Economic Survey of Latin America, 1948.** 279 pages 1949. United Nations, Department of Economic Affairs, Lake Success, New York.

Divided into two main parts: trends in production and other economic aspects. First part: Manufacturing, the construction industry, mining, and agriculture. Part 2: Population characteristics, transportation, foreign trade, balance of payments, the inflationary process, and Latin America and European recovery. (A4)

209-A. (Book) **European Steel Trends in the Setting of the World Market.** 148 pages. 1949. United Nations, Department of Economic Affairs, Steel Division, Economic Commission for Europe, Geneva, Switzerland.

An extensive study containing numerous tables and graphs. (A4, ST)

210-A. (Book) **ASM-SLA Metallurgical Literature Classification.** T. D. Yensen, chairman. 49 pages + about 130 looseleaf punched sheets. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. Booklet: $1.00; Workbook, $3.00.

Full details of new classification system for metallurgical literature prepared by a joint committee of American Society for Metals and Special Libraries Association. Application to classifying and indexing the metallurgical literature and to a punched-card filing system for personal or library use (sample card included.) Explains new classification and coding system used by "A.S.M. Review of Metal Literature". Includes alphabetical index relating metallurgical terms to code number. Purpose of the "Workbook" is to provide a ready means of expanding the classification and adapting it to individual needs. (A10)

211-A. Should U. S. Suspend Copper Import Duty? *Metals,* v. 21, July 1950, p. 6-7, 9-12.

Debate in print. Affirmative is taken by John A. Danaher (Revere Copper and Brass) and Simon D. Strauss (American Smelting & Refining Co.). Negative view is supported by A. D. Parsons (representing 14 domestic copper producers) and A. E. Petermann (Calumet and Hecla Consolidated Copper Co.). (A4, Cu)

212-A. Argentine Steel Plant Nears 100,000-Ton Capacity. A. W. Gregg. *Iron Age,* v. 166, July 20, 1950, p. 101-103.

Rapid development of Argentine's steel producer which has increased its yearly tonnage from 3500 metric tons 7 years ago to a proposed 100,000 tons in 1950. (A4, D general, ST)

213-A. An Appraisal: Today's World Aluminum Industry. Irving Lipkowitz. *Modern Metals,* v. 6, July 1950, p. 16-18.

Surveys the industry with special emphasis on Russia's productive facilities. Estimates of 1950 Russian production vary all the way from 50 to 1000 million lb. (A4, Al)

214-A. Some Technological and Economic Problems of the Steel Industry. R. E. Zimmerman. *Mines Magazine,* v. 40, July 1950, p. 8, 43-44, 46.

Iron-ore supply situation, industrial waste problems, sulfur in coking coal, the pension problem, government regulation, etc. (A4, B10, Fe)

215-A. Along P & W's Jet Production Line. *Aviation Week,* v. 53, July 24, 1950, p. 22, 24-25.

Miscellaneous finishing, joining, machining, assembly, and inspection procedures. (A5, T24)

216-A. Acid Salvaging Process Cuts Pickling Costs. F. J. Bartholomew. *Steel,* v. 127, July 31, 1950, p. 68, 70, 72.

New process includes concentration of free acid, separation of crystallized ferrous sulfate by filtration, and converting the sulfate to fresh sulfuric acid. Equipment and procedures for the last step. The sulfate is formed into pellets and roasted with coal or pyrite in a Dwight-Lloyd sintering machine, forming SO_2 and Fe_2O_3. The former is used to make H_2SO_4 and the latter returns to the steel-making furnace. (A8, L12, ST)

217-A. Modern Fabricating and Finishing Equipment Speeds Specialized Production. Lee Beckman. *Finish,* v. 7. Aug. 1950, p. 19-25, 50-51.

The effective use of modern fabricating, welding, and finishing equipment, plus simplified storage and handling methods, in the quantity production of home-heating registers. (A5, G1, K3, L26, CN)

218-A. Automobile Engineering Research. *Engineering,* v. 170, July 7, 1950, p. 8-9.

Describes and illustrates work of Motor Industries Research Assn. in England, which includes lubricants,

fuels, materials of construction, and design. Fatigue strength, service failures, abrasive wear, corrosion, and stresses of various assemblies are being studied. (A9, T21)

219-A. High Temperature Steel for Jet Engines: Research and Development Programme of William Jessop and Sons, Limited. *British Steelmaker,* v. 16, July 1950, p. 352-354.
(A9, T25, SG-h, AY)

220-A. Practical Methods for Treatment of Plating Room Wastes. *Products Finishing,* v. 14, Aug. 1950, p. 68, 70, 72, 74, 76, 78, 80, 82, 84.

Surveys papers presented at 5th Industrial Waste Conference held recently at Purdue University.
(A8, L17)

221-A. Steel Behind the Iron Curtain. Demitri B. Shimkin. *Iron Age,* v. 166, Aug. 3, 1950, p. 67-72; Aug. 10, 1950, p. 65-69.

Facilities, ore resources, technology, and recent production. Includes data on other metallic ores besides iron. Second part emphasizes Far Eastern resources (Manchuria and North Korea).
(A4, B10, Fe)

222-A. Aluminum Project in B. C. R. V. Steel. *Canadian Metals,* v. 13, July 1950, p. 8-10, 50.

Reviews long-term project of Aluminum Co. of Canada which is still in the survey stages. (A4, A5, Al)

223-A. Conservation of Resources; a Metallurgist's View of the United Nations Scientific Conference. H. Sutton. *Metal Industry,* v. 77, July 7, 1950, p. 3-5; July 14, 1950, p. 19-22; July 21, 1950, p. 35-38; July 28, 1950, p. 57-58.

In the July 7 issue, a few papers of wide interest are discussed: "The World Resources Situation", Fairfield Osborn; "World Resources and World Population", Colin Clark; "Critical Mineral Shortages", H. L. Keenleyside; "Conservation of Mineral Resources", Donald H. McLaughlin; and two papers on "Metals in Relation to Living Standards", D. H. Wadia and Howard Meyerhoff. In the July 14 issue, papers of more specific metallurgical interest are reviewed. They include several on techniques, possibilities, costs, and other features of mineral discovery; one on conservation of metals in use; one on electrolytic tinplate; and one on conservation of lead. The July 21 issue reviews several papers on corrosion, its costs and prevention by coatings, and other methods. The concluding installment deals with uses and advantages of Ti, Al, and Mg (3 papers); and with mineral resources of the Dead Sea.
(A4, B10, L17, R general)

224-A. Aluminium Explosion Hazards; Violent Reactions with Chlorinated Hydrocarbons. *Chemical Age,* v. 63, July 29, 1950, p. 155-157.

Test results made by Underwriters' Laboratories, Chicago. Powdered Al or Mg reacted violently with a variety of chlorinated hydrocarbons at ordinary or moderately elevated temperatures. (A7, Mg, Al)

225-A. Problems in the Use of Molten Chemical Salts for the Separation of High and Low-Melting Metals. (In German.) Edmund R. Thews and Martin Stromeyer. *Chemische Technik,* v. 2, May 1950, p. 157-161.

The older methods of separating metals and results obtained on scrap nonferrous metals with borax-boric acid and with NaCl-NaOH mixtures. Advantages and disadvantages of the proposed method.
(A8, C28, EG-a)

226-A. Metallurgy in Spain. F. R. Morral. *Metal Progress,* v. 58, Aug. 1950, p. 197-198.

Present status. (A4)

227-A. Smelting Mixed Flue Dust. C. W. Jensen. *Mining Magazine,* v. 82, Apr. 1950, p. 211-214.

Continental practice and equipment for material containing Sn, Pb, and Zn. (A8, C21, Pb, Sn, Zn)

228-A. Value of Domestic Production of Minerals From Various Classes of Rock. V. E. McKelvey, J. E. Crawford, D. F. Davidson, and R. L. Boardman. *Economic Geology and the Bulletin of the Society of Economic Geologists,* v. 45, Aug. 1950, p. 470-479.

Fluids and sedimentary rocks accounted for 48 and 36%, respectively, of the total value of 1946 domestic mineral production. Epigenetic (vein and replacement) and metamorphic deposits each contributed 6% of the total, and residual and igneous deposits accounted for 3 and 1%, respectively. Fuels were 77% of the total. (A4)

229-A. (Book) Newnes Engineer's Reference Book. Ed. 3. F. J. Camm, editor. 1608 pages. 1950. George Newnes, Ltd., Tower House, Southampton St., London W.C. 2, England. 45s.

Over 70 sections including such subjects as thermodynamics, hydraulics, workshop mathematics, the various workshop processes, machine design, and metallurgy. Numerous useful tables and formulas

are included. Over 300 pages have been added to this edition.
(A general)

230-A. (Book) **British Non-Ferrous Metals Directory 1949.** Ed. 2. 261 pages. Metal Information Bureau, Ltd., 27 Albemarle St., London, W. 1., England. 10s.

A guide to British producers and suppliers of raw and semi-finished nonferrous metals. Considerable improvements have been made in the size and general production of the book compared with the first edition, issued in 1947.
(A4, EG-a)

231-A. (Book) **Minerais et Métaux Statistiques** (Ore and Metal Statistics), 1948. 158 pages. 1949. Minerais et Métaux Société Anonyne, Paris.

Includes data for Cu, Pb, Zn, Sn, Sb, Cd, Co, Ni, Al, Mg, S, and Au.
(A4)

232-A. Chemico's New Pickle Liquor Process. F. J. Bartholomew. *Chemical Engineering,* v. 57, Aug. 1950, p. 118-120.

See abstract of "Acid Salvaging Process Cuts Pickling Costs", *Steel,* item 216-A, 1950. (A8, L12, ST)

233-A. Speedometer Output Upped by Good Production Planning. *Production Engineering & Management,* v. 26, Sept. 1950, p. 57-64.

Miscellaneous fabrication and finishing procedures at AC Spark Plug Co. (A5)

234-A. Severe Investigation Shows Magnesium Logging Wedges Not a Fire Hazard. E. M. Cramer and A. R. Hard. *Light Metal Age,* v. 8, Aug. 1950, p. 10-11, 21.

How this conclusion was reached by the Division of Industrial Research of the State College of Washington. (A7, T3, Mg)

235-A. 1949 Copper Production. *Skillings' Mining Review,* v. 39, Sept. 9, 1950, p. 1, 4.

Production data for the major U. S. companies. (A4, Cu)

236-A. Air Pollution by Industrial Fumes, Gases, and Dusts. Louis C. McCabe. *Mining Engineering,* v. 187, Sept. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, 1950, p. 971-973.

Quantitative data from a number of metallurgical operations, and allowable discharge in terms of effluent-weight ratio. Typical installations for recovery of stack effluents. (A7)

237-A. What's Ahead in Steelmaking? John D. Knox. *Steel,* v. 127, Sept. 18, 1950, p. 111-113, 136.

Surveys prospects, including taconite development, larger blast furnaces and openhearths, faster continuous galvanizing and tinning of coiled stock, continuous casting, and new extrusion processes. Diagrams and illustrations. (A general, ST)

238-A. More Steel for War and Peace. *Steel,* v. 127, Sept. 18, 1950, p. 114-116.

Trend toward increased steel capacity. (A4, ST)

239-A. National Tube Expansion at Lorain Works. T. J. Ess. *Iron and Steel Engineer,* v. 27, Sept. 1950, p. 36N-58N.

Includes the coke plant, blast furnaces, openhearth, bessemer, rolling mills, and pipe mills.
(A5, D general, F general, ST)

240-A. Disposal of Cyanides by Complexation. David Milne. *Sewage and Industrial Wastes,* v. 22, Sept. 1950, p. 1192-1199.

The possibility of safe disposal of cyanide rinse waters by combining with nickel-bearing rinses to form the tightly bound nickelocyanide complex. The theory of complex-forming reactions, and the equilibria existing during operation of the treatment process. (A8)

241-A. The Present Status of Plating-Room Waste Disposal. C. Fred Gurnham and Barnett F. Dodge. *Proceedings of the American Electroplaters' Society,* v. 36, 1949, p. 251-263; discussion, p. 263.

New state and federal programs. Typical plant installations. (A8, L17)

242-A. The New Continuous Brass Mill of the Scovill Manufacturing Company, Waterbury, Conn., U. S. A. J. J. Hoben and J. F. Mulvey. *Journal of the Institute of Metals,* v. 77, July 1950, p. 357-388.

Details of the plant, including melting, continuous casting, rolling, annealing, strip-pickling, slitting and shearing, inspection, and handling equipment and procedures.
(A5, C5, Cu)

243-A. The Safe Use of Perchloric-Acetic Electropolishing Baths. Pierre A. Jacquet. *Metal Finishing,* v. 47, Nov. 1949, p. 62-69.

General conditions for this bath which the author has pioneered and recommended since 1931. Summarizes recent research on this subject in France by Medard and Sartorius. 11 ref. (A7, L13)

244-A. (Book) **Business. . .Big and Small. . .Built America.** 172 pages. 1950. U. S. Steel Corp., 71 Broadway, New York, N. Y.

Statements by officials of U. S. Steel at the Apr. 1950 hearings before the Subcommittee on the Study of Monopoly Power of the House Committee on the Judiciary. Availability of iron ore, research contributions, competition, profits, etc. (A4, ST)

245-A. (Book) **Minerals Yearbook 1948.** Allan F. Matthews, editor. 1652 pages. 1950. U. S. Government Printing Office, Washington, D. C.

This edition adds statistics on foreign minerals as well as regional and State presentation of domestic data. (A4)

246-A. (Book) **Scientific & Technical Cooperation in the American Republics, 1939-1949.** 145 pages. 1949. Interdepartmental Committee on Scientific and Cultural Cooperation, Washington, D. C.

Cooperative projects conducted by the U. S. with American Republics, are reported by country. Covers scientific, social, and cultural research; includes metallurgy. (A9)

247-A. (Book) **National Physical Laboratory Reports for the Years 1946 and 1947.** *His Majesty's Stationery Office,* York House, Kingsway, W. C. 2, England. 76 pages and 58 pages.

Brief outlines of projects and progress in the aerodynamics, electricity, engineering, light, mathematics, metallurgy, metrology, physics, radio, and ship divisions. Includes list of papers published by each division. (A9)

248-A. (Book) **Annual Statistical Report.** 106 pages. 1949. American Iron and Steel Institute, 350 Fifth Ave., New York 1, N. Y.

Statistics relating to the iron and steel industry of the United States and Canada for the year 1949 together with comparable figures for some preceding years. Several new tables are included. One set shows inventory of scrap and pig iron and consumption of those metals by type of furnace for 1946-1949. Another table shows production of electrical sheets and strip, and sheets for enameling. Details covering United States imports and exports of iron and steel products by countries. (A4, Fe, ST, CI)

249-A. Metal Production in Korea. *Metal Progress,* v. 58, Sept. 1950, p. 324.

Mineral wealth and production facilities and tonnages. (A4)

250-A. The Iron Curtain in Metallurgical Literature. Henry Brutcher. *Metal Progress,* v. 58, Sept. 1950, p. 331-333, 368, 370, 372, 374, 376, 378.

The appearance, disappearance, and present status of Russian metallurgical and scientific journals over the past 25-30 years. How use of non-Russian titles and abstracts in the Russian journals varies with the political situation. Unreliability of soviet statistics. Sad story of an attempt to secure technical literature directly from a Russian scientist. (A3)

251-A. Steel Supply Facts. *Modern Industry,* v. 20, Sept. 15, 1950, p. 48-49.

Economic analysis, clarified by a graph, a table, and a flow diagram of the steel industry. (A4, ST)

252-A. Lone Star Steel Rapidly Increasing Service in the Southwest. Charles Longenecker. *Blast Furnace and Steel Plant,* v. 38, Sept. 1950, p. 1042-1049.

Equipment and procedures. Supplies of ore and coal, the former from northeastern Texas, the latter from Oklahoma. Limestone and dolomite are also obtained from Texas or Oklahoma; manganese from Mexico or Arkansas. (A5, B10, D general)

253-A. Business Outlook for Metals. Joseph Zimmerman. *Journal of the American Zinc Institute,* v. 28, 1950, p. 14-22; discussion, p. 22-23.

Economic analysis and forecast. (A4, Zn)

254-A. Domestic Zinc Outlook. H. I. Young. *Journal of the American Zinc Institute,* v. 28, 1950, p. 23-29.

Economic analysis and forecast. (A4, Zn)

255-A. Outlook for Mining. James Boyd. *Journal of the American Zinc Institute,* v. 28, 1950, p. 29-36; discussion, p. 36-38.

Emphasis on the nonferrous branch. (A4, B12, EG-a)

256-A. Outlook for Zinc in the Wrought Brass Industry. J. R. Freeman, Jr. *Journal of the American Zinc Institute,* v. 28, 1950, p. 43-50.

Economic analysis and forecast. (A4, Zn, Cu)

257-A. Zinc in Die Castings. R. G. Kenly. *Journal of the American Zinc Institute,* v. 28, 1950, p. 50-56; discussion, p. 56.

Economic analysis and forecast. (A4, Zn)

258-A. The Current World Zinc Situation. R. L. Wilcox. *Journal of the American Zinc Institute,* v. 28, 1950, p. 78-91; discussion, p. 92-93. (A4, Zn)

259-A. Repair and Reclamation of Non-Ferrous Castings. G. Elston, Chairman. *Foundry Trade Journal,* v. 89, Sept. 14, 1950, p. 243-253.

Subcommittee report covers the following methods of salvaging castings: burning; welding; brazing and soldering; annealing; impregnation; caulking and plugging; plating; and metal spraying. 48 ref. (A8, K general, L17, L23, L24, EG-a)

260-A. Some Means of Surplus Heat Recovery and Utilization. W. A. Johnson. *Institution of Mechanical Engineers, Proceedings,* v. 162, no. 2, 1950, p. 205-208.

Methods for heat recovery in metallurgical processes, indicating present status and future prospects. (A8)

261-A. Copper Price in State of Confusion; Hectic Market Conditions Due to Fear of Shortage. Joseph Zimmerman. *Metals,* v. 21, Sept. 1950, p. 6-7, 9.

Present conditions. (A4, Cu)

262-A. Germanium From Flue Dust; Growing Industrial Value of a Rare Element. A. E. Williams. *Chemical Age,* v. 63, Sept. 23, 1950, p. 431-432.

Recent work on recovery and applications. (A8, T general, Ge)

263-A. A Decade of Metallurgical Science. Cyril Stanley Smith. *Metal Progress,* v. 58, Oct. 1950, p. 478-483.

Fundamental developments of the past decade. Shows that although "metallurgy is still a compound of much art and relatively little science," the scientific approach is gaining in strength and has achieved notable progress. Dislocations and the Bragg soap-bubble arrays; recovery and recrystallization; development of new magnetic materials; new experimental techniques; professional relations; and future trends. (A general)

264-A. Metallurgy in South Africa. *Metal Progress,* v. 58, Oct. 1950, p. 564, 566. Condensed from "The Utilization of Raw Material in the Ferrous Metallurgical Industry in the Union of South Africa", T. J. W. Jorden.

Previously abstracted from *Engineering & Chemical Digest.* (A4, D general, Fe)

265-A. Metallurgist's Notebook. *Iron Age,* v. 166, Oct. 12, 1950, p. 164-165, 198, 200, 202, 204.

Short case histories that tell the practical man how others have solved tough problems in metallurgy, heat treating, and process control. Also includes metallographic techniques, bath-temperature measurement, inspection, powder metallurgy, and pickling. (A general)

266-A. Metalworking Research Reaches All-Time High: Battelle Memorial Institute. S. L. Case and H. E. Johnson. *Iron Age,* v. 166, Oct. 12, 1950, p. 166-169.

First of a series of articles about nonprofit research organizations. Foundries, metal producers, fabricators, and their suppliers are sponsoring projects in both applied and basic research. Small companies unable to afford research departments of their own are taking advantage of the extensive facilities and skills of the research institutes. Battelle's facilities, organization, method of attack, and typical research projects. (A9)

267-A. Research Today for Tomorrow's Profits. A. H. Allen. *Steel,* v. 127, Oct. 16, 1950, p. 102-105.

Phenomenal expansion of research expenditures during the past 20 years. Costs, economic advantages, and achievements of research. (A9)

268-A. What's Ahead in Metals. *Product Engineering,* v. 21, Oct. 1950, p. 87-95.

New technological developments which promise new and varied applications. (A general)

269-A. Treatment of Plating Wastes at Electric Auto-Lite Plant, Lockland, Ohio. Allen Reed. *Sewage and Industrial Wastes,* v. 22, Oct. 1950, p. 1338-1342.

(A8, L12)

270-A. Electrolytic Regeneration of Sulphuric Acid Used for Pickling Copper. K. R. Hanna and C. E. Naylor. *Plating Notes,* v. 2, Aug. 1950, p. 124-126.

Procedure. (A8, L12)

271-A. (Book) **Metal Statistics.** Ed. 43. N. J. Langer. 800 pages. 1950. American Metal Market, 18 Cliff St., New York 7, N. Y.

The same general assortment of statistical information, on ferrous and nonferrous metals and miscellaneous economic subjects, as previous issues. Prices are generally based on the quotations published in *American Metal Market,* and represent wholesale prices. A buyers' directory of some 130 pages is included. (A4)

272-A. (Book) **Steel — Acquisitions, Mergers, and Expansion of 12 Major Companies, 1900 to 1950; Hearings Before the Select Committee on Small Business, House of Representatives, Eighty-First Congress, Second Session.** 80 pages. 1950. U. S. Government Printing Office, Washington.

Appendixes give tabular data on capacity for production of iron and steel products and products for sale. 1947 census of manufacturers data and 1949 shipments of steel products are also given. (A4, ST)

273-A. (Book) **Introduction to Industrial Metallurgy.** Leslie Aitchison.

456 pages. 1949. Macdonald & Evans, London, England. 30s.

Deals largely with factory organization, management and control, costs, and labor relations. Pure techniques of metallurgical production are not treated, these being reserved for companion volumes yet to appear. (A4, A5, A6)

274-A. (Book) **Industrial Waste Disposal.** Franklyn Roberts and Arthur H. Kirkpatrick, compilers. 84 pages. 1950. Franklyn Roberts, 3288 W. Boston Blvd., Detroit 6, Mich. $3.00.

A compilation of articles dealing with the treatment of waste from the metallurgical industries. How some of the plants have solved their waste-disposal problems. Contains Federal Water Pollution Act. No. 845, several state laws and a typical city ordinance. (A8)

275-A. (Book) **Year Book of the American Bureau of Metal Statistics.** Ed. 29. 112 pages. American Bureau of Metal Statistics, 50 Broadway, New York 4, N. Y. $3.00.

Presents largely the same coverage as formerly, comprising statistical data relative to Cu, Pb, and Zn, as well as the other nonferrous metals. General economic statistics of the U. S. are included. (A4, EG-a)

276-A. (Book) **Mineral Industries Education.** Edward Steidle. 252 pages. Mineral Industries Extension, State College, Pa. $3.00.

Dean of School of Mineral Industries, Pennsylvania State College, presents his philosophy of education as it affects the mineral arts and sciences. In three parts: Roots of human progress; a philosophy for conservatism; and wanted—mineral industries colleges. (A3)

277-A. Industrial Mobilization Plan for the Malleable Iron Castings Industry. *Foundry,* v. 78, Nov. 1950, p. 100, 230, 232-233.

Details of the malleable-iron foundry industry's productive capacity from a report submitted recently to the Munitions Board by The Malleable Iron Castings Subcommittee of the Foundry Industry Advisory Committee.
(A6, E general, CI)

278-A. The Castings Industry and the Munitions Board. Earl D. Payne. *Foundry,* v. 78, Nov. 1950, p. 101, 253-259.

Functions of the Munitions Board and its relationship to the castings industry during the present emergency. (A6, E general)

279-A. G. E. Opens Lynn Measurements Laboratory. *Steel,* v. 127, Oct. 30, 1950, p. 59-60.

Meter and Instrument Divisions laboratory for developing new measuring devices, creating new materials, and analyzing and improving designs. (A9)

280-A. How Defense Production Will Affect Materials Supplies. Leon M. Jaroff. *Materials & Methods,* v. 32, Oct. 1950, p. 51-55.

Review of the current materials picture and some conjectures on what we can expect in the event of an all-out war effort. Individual metals and other basic materials are discussed separately. (A4, A6)

281-A. A Close-Up of the Inter-Mountain Area's Metalworking Industry Shows Strength. James Joseph. *Western Metals,* v. 8, Oct. 1950, p. 23-25.

Reports on products, plant facilities, expansions, purchases of machinery and equipment, and future potential of the metalworking industry in above region, based on a series of interviews with plant managers and production executives.
(A6)

282-A. Metal Fabrication Potential of Southern California. *Western Metals,* v. 8, Oct. 1950, p. 30-33.

An illustrated survey. Los Angeles area is covered by E. K. Young; and the San Diego area by George C. Clark. (A6)

283-A. Analysis of Ore Residues for Ionium and Protactinium. L. I. Katzin, Q. Van Winkle, and J. Sedley. *Journal of the American Chemical Society,* v. 72, Oct. 1950, p. 4815-4817.

Analysis of some residue fractions which have not previously been considered as sources for protactinium (Pa^{231}) and ionium (Th^{230}), but which may prove to be convenient sources of these materials. On the basis of the results, a number of milligrams of Pa and approximately one-half gram of Th (with three times as much Th^{232}) were obtained in pure state, from a carbonate fraction. Yields of Pa correspond to 50-60% of the material indicated by preliminary analysis. 11 ref.
(A8, S11, EG-h)

284-A. Application of Ion Exchange; Copper-Amberlite IR-120 in Fixed Beds. W. A. Selke and Harding Bliss. *Chemical Engineering Progress* (Engineering Section), v. 46, Oct. 1950, p. 509-516; discussion, p. 516.

Experimental work on method for treatment of dilute wastes, such as wash waters from metal pickling or plating operations. 17 ref. (A8)

285-A. Blast-Furnace Slag Cement. J. A. Brothers and M. R. Foran. *Canadian Mining and Metallurgical Bulletin,* v. 43, Oct. 1950, p. 569-579; *Transactions of the Canadian Institute of*

Mining and Metallurgy, v. 53, 1950, p. 407-417.

Progress made in the manufacture of hydraulic cement from iron blast furnace slag by grinding the granulated material with other constituents. Influence of chemical and mineralogical composition of the slag, conditions of granulation, manner of drying, and fineness of grinding, on hydraulic properties of the cement. 12 ref. (A8, Fe)

286-A. Destruction of Cyanide in Waste Waters by Chlorination. G. E. Eden, B. L. Hampson, and A. B. Wheatland. *Journal of the Society of Chemical Industry,* v. 69, Aug. 1950, p. 244-249.

A study of the reactions of Na and Ca hypochlorites with buffered alkaline solutions of KCN. A process was developed for treating electroplating wastes or other waste waters containing cyanide, by reaction with Ca hypochlorite at pH 11. The process is applicable to liquids containing simple cyanides and the complex cyanides of Zn, Cd, and Cr, but not to solutions containing Ni. 14 ref. (A8, L17)

287-A. Communications Metallurgy. E. E. Schumacher. *Engineering,* v. 170, Oct. 6, 1950, p. 296. (A condensation.)

Metallurgical research problems at Bell Telephone Laboratories in the U. S. (A9, T1)

288-A. The Status of the Aluminum Industry. *Light Metal Age,* v. 8, Oct. 1950, p. 10, 26.

A report by the Aluminum Association. (A4, Al)

289-A. Sees Need for World Control of Zinc by a Combined Materials Resources Board. R. L. Wilcox. *Metals,* v. 21, Oct. 1950, p. 8-9.

Opinions of Chief, Nonferrous Metals Branch, E.C.A. (A4, Zn)

290-A. U. S. Must Rely Heavily on Scrap Metals To Meet Defense Production Requirements. Charles W. Merrill. *Metals,* v. 21, Oct. 1950, p. 10-11.

Excerpts from address by Chief, Base Metals Branch, Bureau of Mines. (A4)

291-A. Economics of Waste Treatment; With Particular Reference to Acid, Plating, Paper, and Oil Wastes. V. J. Calise. *Water & Sewage Works,* v. 97, Nov. 1950, p. 479-483.

Includes flow and equipment diagrams. (A8)

292-A. Tank Rebuilding Speeded by Fixtures. Rupert Le Grand. *American Machinist,* v. 94, Oct. 30, 1950, p. 108-114.

Miscellaneous procedures at Detroit Arsenal. Flame cutting, welding, machining, drilling, and annealing play important roles. (A5, T2, ST)

293-A. Metallurgical Furnace Stacks. C. A. Bishop. *American Industrial Hygiene Association Quarterly,* v. 11, Mar. 1950, p. 34-39.

The various types of furnaces and the progress which has been made in satisfying the requirements for metallurgical stacks of Smoke Control Ordinance of Allegheny County, Pa. (A7)

294-A. The World's Cheapest Steel. *Fortune,* v. 42, Nov. 1950, p. 82-89, 186, 189-190, 192.

Story of an Australian monopoly—The Broken Hill Proprietary Co., Ltd. (A5, ST)

295-A. The Squeeze on Nickel. *Fortune,* v. 42, Nov. 1950, p. 93-96, 194, 196.

The world nickel situation, with emphasis on the monopolistic character of International Nickel Co. (A4, Ni)

296-A. Economic Utilization of Sulfur Dioxide From Metallurgical Gases. R. A. King. *Industrial and Engineering Chemistry,* v. 42, Nov. 1950, p. 2241-2248.

The peculiar conditions of dispersion of smelter smoke at Trail, B. C.; development of various sulfur-recovery processes; technical and economic considerations involved. At present all roaster and sintering plant gas is treated for sulfur recovery, and iron concentrate is roasted intermittently, depending on demand for acid and availability of Zn concentrates. Total current loss to the atmosphere is less than 9% of the sulfur charged. 12 ref. (A8, B15, C21)

297-A. High Purity Sulfur From Smelter Gases; Reduction With Natural Gas. Edward P. Fleming and T. Cleon Fitt. *Industrial and Engineering Chemistry,* v. 42, Nov. 1950, p. 2249-2253.

Difficulties encountered in operating the coke-reduction process and advantages to be derived by substitution of natural gas as a reducing agent, when this is available. Development of the methane process over five years of operation of a semicommercial plant at Garfield, Utah. In general, the process consists of high-temperature combustion of approximately 7% SO_2 gas with an automatically controlled volume of natural gas. (A8, C21)

298-A. Liquid Sulfur Dioxide From Waste Smelter Gases; Use of Dimethylaniline as Absorbant. Edward P. Fleming and T. Cleon Fitt. *Industrial and Engineering Chemistry,* v. 42, Nov. 1950, p. 2253-2258.

Reviews the various pilot-plant investigations conducted by American Smelting and Refining Co. during the past 30 years in order to perfect the above process. Processes developed along these lines in Europe and reasons given for selection of anhydrous dimethylaniline as the preferred reagent. Flow diagram of a 20-ton plant installed in the company's lead smelter. Possibilities of application to recovery of SO_2 from low-grade industrial gases by use of other reagents. (A8, C21, Pb)

299-A. Recovery of Sulfur Compounds From Atmospheric Contaminants. Morris Katz and R. J. Cole. *Industrial and Engineering Chemistry,* v. 42, Nov. 1950, p. 2258-2269.

Annual losses of sulfur from products discharged to the atmosphere from Zn plants, Pb, Cu and Ni smelters, crude-oil refineries, and from coal combustion, are compared with world native sulfur production and by-product sulfur recovery. The extent to which sulfur emission must be reduced, to avoid injury to plant life, in terms of permissible levels of ground concentration. Methods for recovery of sulfur compounds from SO_2 and H_2S in stack gas. Additional research needed in some industries, for example Ni smelting. 66 ref. (A8, C21)

300-A. Metalworking Research Reaches All-Time High. W. W. Austin, Jr., and Peyton Wheeler. *Iron Age,* v. 166, Nov. 9, 1950, p. 95-98.

Second article of series surveys research facilities and activities of Southern Research Institute, Birmingham, Ala. Additional facilities are being added for metals, ceramics, and protective coatings. (A9)

301-A. Aluminum Industry Seeks To Meet Mounting U. S. Needs. *Chemical and Engineering News,* v. 28, Nov. 13, 1950, p. 3972-3974.

Present status and future prospects. Considers U. S. deterrents to increased production—shortages of bauxite and of electric power. (A4, Al)

302-A. A Report on Taconite. E. W. Davis. *Engineering and Mining Journal,* v. 151, Nov. 1950, p. 84-85.

A profit of 29c per gross ton of pellets delivered to Lower Lake Ports at the current Lake Erie price is indicated by a recent study. (A4, Fe)

303-A. Dwindling Stocks Spur Manganese Recovery From Slag. Russell C. Buehl. *Steel,* v. 127, Nov. 13, 1950, p. 108, 110, 113.

Surveys Bureau of Mines work on processes for reclaiming Mn from openhearth slags. The main process being studied involves use of an experimental blast furnace to reduce the slag, followed by use of an experimental converter to produce a high-Mn slag. Other work of the Bureau on Mn involves several beneficiation procedures. (A8, B14, Mn)

304-A. Chile Starts Operation of Integrated Steel Mill. *Journal of Metals,* v. 188, Nov. 1950, p. 1316. (A5, ST)

305-A. The Development of a Heat Treating Burden Rate. C. G. Towne and Ray Sault. *Metal Treating,* Sept. 1950, p. 7-8, 17-18.

Factors involved include equipment and installation, floor space and rent, quenching oil, fuel, power and light, maintenance, direct and indirect labor, Social Security, Workmen's Compensation, employee-benefit insurance, and general expenses. (A6, J general)

306-A. Growth of the Aluminum Industry. P. M. Menon and B. Krishnamurthy. *Transactions of the Indian Institute of Metals,* v. 1, Apr. 1949, p. 75-84; discussion, p. 85.

Surveys worldwide developments in technology and applications. Includes statistical data. (A4, Al)

307-A. Aluminium and Aluminium Alloys; Present Consumption and Future Possibilities in India. E. A. Langham. *Transactions of the Indian Institute of Metals,* v. 1, Apr. 1949, p. 297-300. (A4, Al)

308-A. The Future of Aluminium in India. R. D. Palmer. *Transactions of the Indian Institute of Metals,* v. 1, Apr. 1949, p. 301-305; discussion, p. 306-308.

Economic survey and forecast. (A4, Al)

309-A. Important Facts About Our Supplies of Non-Ferrous Metals. C. Donald Dallas. *Automotive Industries,* v. 103, Nov. 15, 1950, p. 52, 96, 98, 100.

Present status and future prospects. Considers mainly Cu, Zn, and Al. Arguments against the U. S. tariff on copper. (A4, Cu, Zn, Al)

310-A. The Current Outlook and Future of Magnesium. J. D. Hanawalt. *Modern Metals,* v. 6, Oct. 1950, p. 51, 54.

A question-and-answer session. (A4, Mg)

311-A. Aluminum Today: Supply Situation Worse; No Relief Expected Before 1952. World Allocation Would Help Ease Pinch. W. B. Griffin. *Modern Metals,* v. 6, Oct. 1950, p. 58, 60.

Economic analysis and forecast. (A4, Al)

312-A. Utilization of Light-Alloy Turnings. (In French.) Jean Duport. *Fonderie,* Aug. 1950, p. 2162-2163.

Methods, optimum conditions and flux compositions. (A8, E10, Al)

313-A. Removing Zinc From Zinc-Plated Iron and Steel Scrap. (In German.) Edmund R. Thews and Martin Stromeyer. *Metalloberfläche,* v. 4, sec. A, Aug. 1950, p. 121-123.

Reasons why zinc should be removed from ferrous scrap. The method of removal should depend on the purpose for which the new metal is to be used. (To be continued.) (A8, Fe, Zn)

314-A. (Book) **British Iron and Steel Federations' Statistical Year Book for 1948. Part II. Overseas Countries.** 432 pages and 13 maps. 1950. British Iron and Steel Federation, Steel House, Tothill St., London S.W.1, England. 15s.

Information relating to Eire, Mexico and Southern Rhodesia is included for the first time, while additional statistics are provided for Austria, Brazil, Canada, Italy, Japan, Saar, Spain, and Sweden. A comprehensive statistical guide to the iron and steel industries of the world. (A4, Fe, ST)

315-A. (Book) **Tin, 1949-50: a Review of the World Tin Industry.** 55 pages. International Tin Study Group, The Hague, Netherlands. 4s.

The main developments in the production and consumption of tin in the year to June 30, 1950. A detailed examination (with statistics) of the position in each of the main producing and consuming countries; summarizes the world tinplate position and prospects. (A4, Sn)

316-A. Metalworking Research Reaches All-Time High. Charles. N. Kimball. *Iron Age,* v. 166, Nov. 23, 1950, p. 68-70.

Third of series on research institutes. Facilities of Midwest Research Institute, Kansas City, Mo. Emphasis is on metallurgy. (A9)

317-A. Chile Now a Producer of Steel With Fully Integrated Plant. Frank Senior. *Blast Furnace and Steel Plant,* v. 38, Nov. 1950, p. 1285-1322, 1336.

Extensive details of all phases of this plant, including raw material compositions and sources; materials handling; coke ovens and by-product recovery; blast furnace and auxiliaries; pig casting; the bessemer converter; openhearth furnaces; ingot-mold foundry; blooming, billet, and sheet-bar mill; merchant mill; rolling mill; plate, sheet, and tinplate mills; annealing furnaces; boiler house; distribution of gas, water, electricity, air, oxygen, and acetylene; maintenance; stores; laboratories; etc. (A5, D general, F general, ST)

318-A. A Practical Control Program of Health Hazards in a Metallurgical Research Laboratory. Willard H. Baumann. *American Industrial Hygiene Association Quarterly,* v. 11, Sept. 1950, p. 143-153.

The handling of toxic and radioactive materials in metallurgical research for atomic energy development. Facilities at Oak Ridge. Setting up an environmental control procedure for toxic dusts and fumes. (A7)

319-A. The Proposed New England Steel Plant. Clifford S. Strike. *Iron and Steel Engineer,* v. 27, Nov. 1950, p. 85-87. (A4, ST)

320-A. Wanted—Huge Titanium Expansion. D. I. Brown. *Iron Age,* v. 166, Nov. 30, 1950, p. 87-88.

Present economic and technological status, including military desire for greatly expanded production and industry's reluctance to plunge. (A4, Ti)

321-A. Japanese Mining and Petroleum Industries: Programs Under the Occupation. Robert Y. Grant. *Science,* v. 112, Nov. 17, 1950, p. 577-588.

Surveys metal and coal mining, metallurgical, and petroleum industries, also public agencies for these industries, in Japan. Includes list of reports available. (A4)

322-A. Wise Use of Waste Materials Results in Significant Savings. John D. Coleman. *Materials & Methods,* v. 32, Nov. 1950, p. 55-57.

Planned programs of General Motors plants for reclaiming waste stock from metalworking operations and for salvaging rejects and obsolete parts. (A8)

323-A. Latest Equipment in King-Seeley's New Plant. Joseph Geschelin. *Automotive Industries,* v. 103, Dec. 1, 1950, p. 40-41, 72-73.

Plant produces several lines of automotive and specialty equipment. It consists of a sizeable Zn die-casting department, a large electroplating department, a paint department, and facilities for assembly and machining. (A5, E13, L17, L26)

324-A. Today's Scrap—Availability, Condition and Contamination. Ralph W. Farley and Ray J. McCurdy. *Journal of Metals,* v. 188, Dec. 1950, p. 1435-1438.

As applied to electric-furnace steelmaking. (A8, D5, ST)

325-A. Metalworking Research Reaches All-Time High: Stanford Re-

search Institute. Emo D. Porro. *Iron Age,* v. 166, Dec. 7, 1950, p. 124-126.

Just two years old, the Metals & Minerals Section of Stanford Research Institute has already launched 14 projects in metals and ceramics, most of them for relatively small companies. Facilities and organization. (A9)

326-A. Heaters for Home and Industry. *Western Machinery and Steel World,* v. 41, Nov. 1950, p. 72-75.

Miscellaneous equipment and procedures of H. C. Little Burner Co., San Rafael, Calif., for production of oil-fired home and industrial heating units. Includes casting, press operations, welding, etc. (A5, T27)

327-A. Vapor Degreasing Improves Cabinet Manufacture. Frank P. Cavenagh. *Western Machinery and Steel World,* v. 41, Nov. 1950, p. 77-79.

Use by Stor-All Corp., Inglewood, Calif. Also illustrates press operations, spot welding, etc. (A5, L12)

328-A. Integrated Processing Boosts Conduit Output. Dan Reebel. *Steel,* v. 127, Dec. 11, 1950, p. 94-98.

Continuous straight-flow operation at Mahoning Valley Steel Co., Niles, Ohio. Material traveling at rates of 125-200 ft. per min. is untouched by workers during slitting, seam-welding, forming, induction butt welding, cooling, sizing, shearing, straightening, chamfering and facing, electrogalvanizing, painting, drying, inspecting, and bundling. (A5, ST)

329-A. Steel Is 1-A. E. C. K. Read. *Steelways,* v. 6, Nov. 1950, p. 1-4.

A few of the varied military and industrial uses of steel. Expansion programs underway and planned by various U. S. steel companies. Research under way. (A4, T general, ST)

330-A. Aluminium Production; A Survey of World Capacity To-Day. L. Franzke. *Metal Industry,* v. 77, Nov. 17, 1950, p. 195-197; Nov. 24, 1950, p. 221-222. (Translated from *Chemische Industrie.)* (A4, Al)

331-A. Making the Centurion Tank; Flow Line Production Methods at the Ministry of Supply Ordnance Factory, Barnbow, Leeds. *Machinery* (London), v. 77, Nov. 23, 1950, p. 507-520.

Miscellaneous equipment and procedures. Set-ups for machining and welding are emphasized. (A5, K general, G17, T2, ST)

332-A. Producing Storage Battery Parts With Special Equipment. George E. Stringfellow. *Machinery* (American), v. 57, Dec. 1950, p. 172-178.

Cold-reducing hot rolled steel, continuous tube forming, perforating of steel strip with circular dies, broaching, welding, and producing flakes of pure nickel by an unusual process in which layers of Ni and Cu are alternately plated on steel cylinders.

(A5, G general, H10, T1, CN, Ni)

333-A. Progress in the British Iron and Steel Industry. *Metallurgia,* v. 42, Nov. 1950, p. 276-278.

A survey over the past two decades. (A4, Fe, ST)

334-A. Mineral Industries Research. *Pennsylvania State College, School of Mineral Industries,* Circular 36, 1950, 32 pages. (*Pennsylvania State College Bulletin,* v. 44, Sept. 29, 1950).

Research facilities of the school. Fields covered are earth sciences, including geography, geology, geophysics and geochemistry, meteorology, and mineralogy; mineral engineering, including mineral economics, mining, mineral preparation, and petroleum and natural-gas engineering; and mineral technology, including ceramics, fuel technology, and metallurgy. Includes a list of the school's publications. (A9)

335-A. (Book) **Theory and Practice of Industrial Research.** David Bendel Hertz. 385 pages. 1950. McGraw-Hill Book Co., 330 42nd St., New York 18, N. Y. $5.50.

Covers the fundamental requirements of research operations and shows how the organization and structure which may be most profitably utilized follow from an analysis of the elements in the process. Starts with the theoretical background and analytical material on creative mentalities, problem solving, and scientific method, applying these concepts to industrial research. Includes examination of cost and time elements, personnel selection and administration, facilities, patents, and internal and external relationships. (A9)

336-A. (Book) **International Tin Study Group Statistical Year Book, 1949.** 232 pages. 1950. International Tin Study Group, 7 Carel van Bylandtlaan, The Hague, Netherlands. $4.20.

Includes information on mine and smelter production, imports, and exports, tin concentrates and tin-containing goods, consumption, production and trade of the tin-plate and canning industries. (A4, Sn)

SECTION B

RAW MATERIALS and ORE PREPARATION

1B. Sodium Carboxymethyl-Cellulose as a Flocculating Agent for Cyanide Slime Pulps. Claude A. Seger, Jr., and E. E. Brown. *Canadian Mining and Metallurgical Bulletin,* v. 42, Dec. 1949, p. 655-658.

Experimental data for an ore containing a high percentage of talc. Optimum conditions for settling of lime, cyanide, and Carboxel concentrations. (B14)

2B. Milling and Roasting at MacLeod-Cockshutt. R. C. Gegg. *Canadian Mining and Metallurgical Bulletin,* v. 42, Dec. 1949, p. 659-665.

Gold-concentration procedure. Includes flow diagrams. (B13, B15, Au)

3B. Energy-New Surface Relationship in the Crushing of Solids. III. Application of Gas Adsorption Measurements to an Investigation of Crushing of Quartz. J. F. Johnson, J. Axelson, and Edgar L. Piret. *Chemical Engineering Progress* (Engineering Section), v. 45, Dec. 1949, p. 708-715.

Results of an investigation covering a much wider range of energy input to the material than that previously reported. Crushing of screened particles retained in a steel mortar was accomplished by impact and also by slow compression. Surface areas of the samples were measured by gas adsorption and also by the permeability method. 16 ref. (B13)

4B. Study: Lead-Zinc Flotation and Gravity Concentration. *Deco Trefoil,* v. 13, Nov.-Dec. 1949, p. 11-12.

Flowsheet was designed to treat economically approximately 200 tons in 24 hr. of a low-grade dump ore containing lead and zinc values as well as some silver in both sulfide and oxide form. (B14, Pb, Zn)

5B. Refractory Reactions in Vacuum. P. D. Johnson. *Industrial Heating,* v. 16, Dec. 1949, p. 2218, 2220. A condensation.

Behavior of various refractories when heated under vacuum for different lengths of time at high temperature. Carbon, zirconia, thoria, molybdenum, and tungsten may be used satisfactorily up to temperatures of at least 2300° C. Magnesia cannot be used above 1600° C., or beryllia above 2100° C. (B19)

6B. Fundamental and Practical Factors in Ammonia Leaching of Nickel and Cobalt Ores. M. H. Caron. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Jan. 1950, p. 67-90.

Process was in large-scale operation at Nicaro, Cuba, as an emergency measure during World War II. Hitherto unpublished data on various phases of the method, including conditions for ore reduction, leaching, distillation. Possibilities of further development and results of tests on ores other than the Cuban laterites. (B14, Ni, Co)

7B. Refractory Concrete and Cements. A. E. Williams. *Refractories Journal,* v. 25, Nov. 1949, p. 390-400. Reprinted from *Engineering and Boiler House Review.*

Compositions, procedures, and applications. The materials are suitable for furnace construction and other high-temperature work up to 1600° C. (B19)

8B. Bunker Hill's Flash Grind. Frank McKinley. **The Sidney Uses the Flash Grind, Too.** *Engineering and Mining Journal,* v. 151, Jan. 1950, p. 64-67.

Contrary to past accepted grinding practice in the Coeur d'Alene lead-

zinc flotation plants, Bunker Hill and Sidney mills now use a coarse primary grind. Pb and Zn content of the Bunker Hill tailing now runs about half what it used to. (B13, Pb, Zn)

9B. Strong Dosage Is Remedy in Gold Recovery Problem. Keith Kunze. *Engineering and Mining Journal,* v. 151, Jan. 1950, p. 71.

Mixture used to get clean amalgamation of rusty gold in a heavy sulfide concentrate without "floured" quicksilver. (B14, Au)

10B. Flotation of Gray Iron Ores From the Talladega Area, Alabama. H. G. Iverson. *U. S. Bureau of Mines,* Report of Investigations 4570, Dec. 1949, 18 pages.

Reviews past beneficiation work. Characteristics of the ores. Experimental procedure and results. Distribution of impurities in flotation products. (B14, Fe)

11B. Production of Ferrosilicon in India. (In French.) *Journal du Four Electrique et des Industries Electrochimiques,* v. 58, July-Aug. 1949, p. 80-81.

Present status; methods of production; proposed future developments. (B22, Fe)

12B. New Information Concerning the Fixing Mechanism of Flotation Agents. (In German.) O. Neuhoeffer. *Archiv für Metallkunde,* v. 3, Oct. 1949, p. 360-364.

Three distinct processes involved in flotation are: orientation of the collector molecules, fixation in the boundary layer and stabilization of the boundary layer. A new theoretical explanation for the second step is presented. (B14)

13B. Results of Research on Metal-Slag Reactions. (In German.) Willy Oelsen. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 2, Nov. 1949, p. 328-334.

Summarizes research since 1932. General theory and specific topics in ferrous and nonferrous metallurgy, including effect of Mn and Si as steel deoxidizers; reactions between Cu melts and Fe-Cu silicates; deoxidation of Cu melts by Fe and P; effects of Cu silicates and phosphates on Cu melts; heats of formation of alloys and their melts; contribution to metallurgy of Cb and Ta; desulfurization of pig iron with Mn and with soda; formation of double sulfides in alkali sulfide slags; etc. 19 ref. (B21, C general, D general)

14B. Minerals Beneficiation in 1949. S. J. Swainson. *Mining Engineering,* v. 187, Jan. 1950, p. 36-45.

New developments. (B14)

15B. Beneficiation on the Range. L. J. Erck. *Mining Engineering,* v. 187, Jan. 1950, p. 51-53.

Reviews 1949 developments in iron-ore beneficiation on the Mesabi range. (B14, Fe)

16B. Measurement of Equilibrium Forces Between an Air Bubble and an Attached Solid in Water. T. M. Morris. *Mining Engineering; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, Jan. 1950, p. 91-95.

Forces acting between a small rod, one end of which was made water repellent, adhering to a much larger air bubble in water were measured. An equation is deduced which correlates these forces. Importance of the size of bubbles in a flotation cell is emphasized. (B14)

17B. Northern Rhodesia Mufulira Copper Mines Limited Grinding Tests on Conical Trunnion Overflow and Cylindrical Grate Ball Mills. Jack White. *Mining Engineering; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, Jan. 1950, p. 96-97.

Results of testing using ball mills with conical trunnion overflow and cylindrical grate discharge, on identical ore. Object was to determine which mill was the most economical under the particular conditions. (B13, Cu)

18B. The Vanadium Minerals. Part I. Mineral Sources of Vanadium. F. F. Franklin. *Vancoram Review,* v. 6, no. 2, 1949, p. 11-15.

Text supplemented by a table giving geographical location, color, texture, and associated minerals for 39 vanadium minerals. (To be concluded.) (B10, V)

19B. Separability of Solid Substances. (In Russian.) Z. V. Volkova and I. V. Smirnova. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 22, Sept. 1949, p. 965-969.

"Separability" defined as completeness of partition, i.e., by sufficiently small content of particles of heterogeneous composition in mixtures of powders obtained by grinding. Probability of formation of particles of heterogeneous composition and degree of exposure of included and including phases are calculated on the basis of distribution function of powder particles and of grains included in the ground body. (B13)

20B. Useful Life of Rammed Electric-Furnace Linings. (In Russian.) S.

D. Skorokhod. *Ogneupory* (Refractories), v. 14, Aug. 1949, p. 362-364.

Addition of steel shavings and ground blast-furnace slag to the refractory mass and use of refractory briquettes at points of highest wear are suggested as means of increasing the useful life. (B19)

21B. (Book) **Refractories. Ed. 3.** Frederick Harwood Norton. 782 pages. 1949. McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. $8.50.

Fundamental processes of the manufacture and use of refractories. Confined to American practice. New material includes nonplastic casting, hydrostatic molding, hot pressing, laboratory furnaces, properties of pure refractory materials, refractories for nuclear power generation, and refractories for jet propulsion. (B19)

22-B. Recovery of Manganese From Low Grade Ores. *Iron Age,* v. 165, Jan. 19, 1950, p. 81-82. Based on paper by R. D. Hoak and J. Coull.

Process which involves leaching with waste pickle liquor. An oxide concentrate low in impurities and containing upwards of 60% Mn is produced. (B14, Mn)

23-B. The Swedish Iron and Steel Industry. H. U. Ross. *Canadian Mining Journal,* v. 71, Jan. 1950, p. 49-54.

Fuel supply, mining, concentration, and various steelmaking processes. (B general, D general, Fe)

24-B. Electric Heating of Screens. G. W. Craiglow. *American Ceramic Society Bulletin,* v. 29, Jan. 1950, p. 27-29.

Clogging during sizing of materials from the standpoint of its solution with electrically heated screens. While experience has been limited to the ceramic industry, similar conditions exist in chemical, coal, steel, cement, and other industries. (B13)

25-B. South African Source of Uranium. *Chemical Age,* v. 61, Dec. 10, 1949, p. 791-792.

Possible recovery of uranium from the Rand ores. (B10, U)

26-B. Tomorrow's Ore. Edward H. Wisser. *Mining Congress Journal,* v. 36, Jan. 1950, p. 26-30; discussion, p. 31-32, 42.

Basic factors to be considered in the search for new ore deposits. The author and the discussers are unanimous in the opinion that many undiscovered ore bodies still exist in the U. S. (B10)

27-B. Laboratory Concentration of Mercury Ores From Oregon, California, Idaho, and Nevada. R. R. Wells. *U. S. Bureau of Mines,* Report of Investigations 4620, Jan. 1950, 19 pages.

Results of beneficiation studies on ores submitted from 1941 to 1947. (B14, Hg)

28-B. Titanium and Iron Minerals From Black Sands in Bauxite. W. A. Calhoun. *U. S. Bureau of Mines,* Report of Investigations 4621, Jan. 1950, 17 pages.

Methods of recovering Ti and Fe minerals in waste products from Arkansas ores. Screening, tabling, and magnetic separation were used. (B general, Ti, Fe)

29-B. Progress in Research. *Mineral Industries Experiment Station, Pennsylvania State College,* Bulletin No. 53 (Biennium 1947-1949, v. 43, Oct. 21, 1949), 62 pages.

Summary for 1947-1949. Includes mineral beneficiation, petroleum, natural gas, earth sciences, minerals, glass, and fuels. (B general)

30-B. Influence of Composition and Structure of Zinc Blende on Flotability. (In Russian.) I. N. Plaksin, G. N. Khazhinskaya, and T. F. Brovkina. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR) (Section of Technical Sciences), Sept. 1949, p. 1361-1364.

Flotability of sphalerites from different deposits was investigated. It was found that Fe content is one of the factors increasing flotability. (B14, Zn)

31-B. The Beneficiation of Northern Iron Ores. Francis X. Tartaron. *American Iron and Steel Institute* "Technical Committee Activities", 1949, p. 115-128.

Various methods and future prospects. (B14, Fe)

32-B. The Beneficiation Methods for Southern Iron Ore. E. H. Rose. *American Iron and Steel Institute,* "Technical Committee Activities", 1949, p. 221-242.

Deals with ores of the Birmingham, Ala., district. Geology, nature of ore, comparison with Lake Superior ores, and various methods of concentration and separation. (B14, Fe)

33-B. Conditioning Blast Furnace Slag for Commercial Use. Fred Osborne. *American Iron and Steel Institute,* "Technical Committee Activities", 1949, p. 252-263.

Various handling, cooling, crushing, and screening procedures. Applications. (B21, Fe)

34-B. The Effect of Increased Classification Capacity at the Allenby Concentrator. Walter I. Nelson and Harvey Armes. *Canadian Mining and Metallurgical Bulletin,* v. 43, Jan. 1950;

Transactions of the Canadian Institute of Mining and Metallurgy, v. 53, p. 27-32.

New equipment layout for copper concentrator. Comparative results before and after the classifier change. (B13, Cu)

35-B. The First Two Years of Milling at Renabie. E. G. Kearney. *Canadian Mining and Metallurgical Bulletin*, v. 43, Jan. 1950; *Transactions of the Canadian Institute of Mining and Metallurgy*, v. 53, p. 37-44.

Concentration flowsheets and procedures at Ontario gold-mining property. The ore; the milling practice; early ore-dressing investigations; the crushing plant; cyanidation; crushing; flotation; and refining. (B13, B14, Au)

36-B. Iron Ore Beneficiation Leads Advance in Milling. *Engineering and Mining Journal*, v. 151, Feb. 1950, p. 116-119.

Review of 1949 developments. (B14, Fe)

37-B. Iron Ore in 1949. *Skillings' Mining Review*, v. 38, Jan. 28, 1950, p. 1, 4-5.

Production data for various U. S. producing districts. (B10, A4)

38-B. Styrian Iron Ore Production Increasing Due to Austrian Iron and Steel Plan. Joseph Oberegger. *Steel*, v. 126, Feb. 6, 1950, p. 102, 104.

Extensive program of installing modern equipment for Austrian mine will be completed sometime during 1951. (B10, Fe)

39-B. Cerro Bolivar: Saga of an Iron Ore Crisis Averted. T. W. Lippert. *Mining Engineering*, v. 187, Feb. 1950, p. 178-192; *Journal of Metals*, v. 188, Feb. 1950, p. 222-236.

The new Venezuelan iron-ore discovery of U. S. Steel. History of its discovery and investigation. Depletion of the Lake Superior ores and of the work being done on taconite beneficiation and on exploitation of other new deposits in Labrador, Quebec, and elsewhere. (B10, Fe)

40-B. Effect of Conditioning on Flotation of Chalcocite. S. B. Tuwiner and S. Korman. *Mining Engineering; Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 197, Feb. 1950, p. 226-238.

Development of a method for determining thickness of the fluid film upon a polished surface of synthetic chalcocite, to serve as a quantitative evaluation of agitation. Study of minimum collector concentration vs. agitation intensity; effects of dissolved oxygen and sodium sulfide and their electrochemical behavior; oxidation of sulfides in pulps. (B14, Cu)

41-B. Canadian Deposits of Uranium and Thorium. W. F. James, A. H. Lang, Richard Murphy, and S. N. Kesten. *Mining Engineering; Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 187, Feb. 1950, p. 239-255.

Information up to the end of 1948. 22 ref. (B10, Th, U)

42-B. Alumina by the Bayer Process. *Industrial Chemist and Chemical Manufacturer*, v. 25, Sept. 1949, p. 431-438.

Plant operated by British Aluminium Co., Ltd. Comminution of the ore, alkaline digestion, removal of silica, and precipitation of hydrate of alumina. (B14, Al)

43-B. Flotation of Lake Superior District Iron Ores. Fred D. DeVaney. *Skillings' Mining Review*, v. 38, Feb. 11, 1950, p. 1, 4, 6, 15.

New developments since 1947. (B14, Fe)

44-B. Report on the Re-Treatment of Tailings Dump at Evanston Gold Mines, Evanston, W. A. Progress Reports No. 1 and 2. *Joint Investigations of the Council for Scientific and Industrial Research and the Kalgoorlie School of Mines, Kalgoorlie Metallurgical Laboratory* (Kalgoorlie, Australia), Report No. 396, Parts 1 and 2, Mar. 14, 1949, 6 and 7 pages.

Extraction of 3.57 dwts. gold per ton may be expected from tailings with a head value of 5.94 dwts. per ton. (B14, Au)

45-B. The Effect of Surface-Agents on Fine Grinding. (In German.) Eugen Von Szantho. *Zeitschrift für Erzebergbau und Metallhüttenwesen*, v. 2, Dec. 1949, p. 353-359; discussion, p. 359-360.

Wet-grinding experiments show that addition of surface agents favorably affects the grinding of ores, and that a proper concentration of flotation agents can increase the surface of the ground material by more than 100% without increasing the energy consumption. In the grinding of complex ores, specific agents can have selective effect on the grinding operation. 13 ref. (B13)

46-B. Highly Flexible Beneficiation Plant Handles Mesabi Ore Successfully. E. S. Tillinghast. *Mining World*, v. 12, Feb. 1950, p. 33-34.

Plant at Longyear Mine, east of Hibbing, Minn. (B14, Fe)

47-B. Kinetics of Processes of Roasting, Leaching, Washing, and Cementation. (In Russian.) S. L. Rotinyan and B. V. Drozdov. *Zhurnal Obshchei Khimii* (Journal of General Chemistry), v.

19(81), Oct. 1949, p. 1843-1852.

Formulas are derived. Despite differences of these processes, they may all be incorporated into one general relationship, based on calculation of the gradual increase of thickness of the diffusion layer proportional to the amount of reacted diffusing substance. 10 ref. (B general)

48-B. Investigation of the Processes of Calcination and Reduction of Nickel Hydrosilicates by Carbon. (In Russian.) D. P. Bogatskii. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Oct. 1949, p. 1512-1525.

Experimentally investigated from several theoretical and practical viewpoints. Methods of investigation and data. (B15, Ni)

49-B. Refractory Linings for Induction Furnaces. H. J. Chesters, J. Mackenzie, and L. Lee. *Ceramic Age,* v. 54, Nov. 1949, p. 280, 282-283; Dec. 1949, p. 374-375.

A condensation. See abstract of "Steel-Tight Linings for Basic Induction Furnaces", *Transactions of the British Ceramic Society,* item 17-83, 1949. (B19, D6)

50-B. (Book) Minerals and Mineral Deposits. W. R. Jones and David Williams. 248 pages. 1948. Oxford University Press, London.

History, shape, internal structure, physical characteristics, mode of occurrence and importance of minerals. The part that mineral deposits play in international affairs. (B10)

51-B. Atomic Energy and the Mining Industry. *Mining Congress Journal,* v. 36, Feb. 1950, p. 30-33.

Recent developments in prospecting, mining, geology, and treatment of uranium ores. (B12, B10, U)

52-B. A Perspective of Milling Operations. Nathaniel Herz. *Mining Congress Journal,* v. 36, Feb. 1950, p. 44-46, 50.

1949 developments and future prospects. Crushing and grinding, screening and classification, gravity concentration, and flotation. (B13, B14)

53-B. The Cerro Bolivar-Altamira-Arimagua Iron Range: U. S. Steel's Answer to the Iron Ore Shortage. Tom C. Campbell. *Iron Age,* v. 165, Mar. 2, 1950, p. 75-80.

U. S. Steel's strategic iron-ore find in Venezuela. (B10, Fe)

54-B. The Chemistry of Metallurgical Slags. *Industrial Heating,* v. 17, Feb. 1950, p. 262.

Previously abstracted from paper by N. J. Grant and John Chipman, *American Iron and Steel Institute,* Preprint, 1949. See item 2B-152, 1949. (B21, ST)

55-B. Refractories: Types, Properties and Service Behavior. R. P. Heuer and C. E. Grigsby. *Steel,* v. 126, Mar. 6, 1950, p. 86-90, 110, 112, 114, 117; Mar. 13, 1950, p. 94-98, 124.

First article: Types and forms of available refractories, and their major characteristics and service behavior. Second article: Silica, basic, and special refractories. (B19)

56-B. Mining Geology and Exploration. Rodgers Peale. *Mining Congress Journal,* v. 36, Feb. 1950, p. 77-81, 88.

Recent discoveries in the U. S. and abroad. (B10)

57-B. Investigation of Cherry Creek Tungsten District, White Pine County, Nev. George H. Holmes, Jr. *U. S. Bureau of Mines,* Report of Investigations 4631, Feb. 1950, 7 pages.

Physical features and mineral deposits. Mining and milling practices. (B10, B12, B13, W)

58-B. Investigation of the Beecher No. 2 Lithium-Bearing Pegmatite, Custer County, S. Dak. John Paul Gries. *U. S. Bureau of Mines,* Report of Investigations 4632, Feb. 1950, 14 pages.

Beneficiation tests on a composite sample of spodumine-bearing pegmatite containing 2.18% lithia. (B10, B14, Li)

59-B. Investigation of the Zebulon or Privett Manganese Deposit, Wake County, N. C. Thomas W. Thompson. *U. S. Bureau of Mines,* Report of Investigations 4633, Feb. 1950, 15 pages.

Magnetic separation and flotation tests on several samples. (B10, B14, Mn)

60-B. Economic Importance of Pegmatites. Paul M. Tyler. *U. S. Bureau of Mines,* Information Circular 7550, Feb. 1950, 57 pages.

Pegmatites consist principally of potash, feldspar, and quartz, usually mica, and sometimes rare minerals. Location, geology, structure, mining and milling methods and their cost, and general economic considerations. 91 ref. (B10, B12, B13, A4, EG-b)

61-B. Fundamental Principles of Mechanical Size Reduction. II. Physical Processes in Grinding Plants. (In German.) E. Podszus. *Archiv für Metallkunde,* v. 3, Dec. 1949, p. 414-422.

Analysis of the operation of different mills shows that a high degree of efficiency requires a rapid succession of impacts and the elimination of "dead" zones and of predominant flow directions. 14 ref. (B13)

62-B. Zinc and Iron. (In German.) A. Kutzelnigg. *Archiv für Metallkunde*, v. 3, Dec. 1949, p. 438-440.

Effect of impurities on the reducibility and properties of zinc and iron ores and the biological role of these two metals in the plant and animal world. The metallurgical and biological interaction between Zn and Fe. 21 ref. (B10, Zn, Fe)

63-B. Symposium on Milling Devices and Practices. J. F. Myers and R. J. Tower. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 11-25; discussion, p. 25.

Previously abstracted from *Mining Technology*. See item 1-71, 1947. (B13)

64-B. Milling Lead-Zinc Ores at Iron King Mine, Prescott, Arizona. H. R. Hendricks. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 26-30.

Previously abstracted from *Mining Technology*. See item 1-120, 1947. (B13, Pb, Zn)

65-B. Milling Practice at New Lead-Zinc Concentrator of Phelps Dodge Corporation. R. C. Thompson. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 31-40.

Previously abstracted from *Mining Technology*. See item 1-119, 1947. (B13, Pb, Zn)

66-B. Milling Practices at Concentrator of Morenci Reduction Works. B. H. Cody. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 41-66.

Previously abstracted from *Mining Technology*. See item 1-117, 1947. (B13, Cu)

67-B. Mufulira Copper Mines Limited, Concentrator, Northern Rhodesia. Jack White and Ralph B. Adair. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 67-75; discussion, p. 76-78.

Previously abstracted from *Mining Technology*. See item 1c-17, 1948. (B14, Cu)

68-B. Description of Concentrating Operations, Roan Antelope Copper Mines Limited, Northern Rhodesia. M. R. Goldick. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 79-94.

Previously abstracted from *Mining Technology*. See item 1c-18, 1948. (B14, Cu)

69-B. Milling Practice at Idarado Mining Company. F. W. McQuiston, Jr. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 95-100.

Previously abstracted from *Mining Technology*. See item 1c-42, 1948. (B13, B14, Ag, Au, Cu, Pb, Zn)

70-B. Metallurgy at National Lead Company, MacIntyre Development. Frank R. Milliken. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 101-114; discussion, p. 114-115.

Previously abstracted from *Mining Technology*. See item 1c-43, 1948. (B14, Pb)

71-B. Tailings and Mine-Dump Reclamation in the Coeur d'Alenes During World War II. W. L. Zeigler. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 116-125.

Previously abstracted from *Mining Technology*. See item 1-47, 1947. (B14, Ag, Pb, Zn)

72-B. The Application of Xanthates to Flotation. Norman Weiss. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 145-156.

Previously abstracted from *Mining Technology*. See item 1-132, 1947. (B14)

73-B. Effect of "Metso" (Sodium Meta-Silicate) on Mill Recoveries of Alta-St. Louis Ores. Henry P. Ehrlinger. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 157-159.

Previously abstracted from *Mining Technology*. See item 1-158, 1947. (B13, Ag, Au, Cu, Pb, Zn)

74-B. Effects of Oxidation of Sulphide Minerals on Their Flotation Properties. Enid C. Plante and K. L. Sutherland. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 160-188.

Previously abstracted from *Mining Technology*. See item 1a-4, 1948. (B14)

75-B. Flotation of Unoxidized and Oxidized Sulphide Minerals—Antimonite, Arsenopyrite, Covellite, Lollingite, Marcasite, Orpiment, Pyrrhotite and Tetrahedrite. Enid C. Plante. *Transactions of the American Institute of*

Mining and Metallurgical Engineers (Minerals Beneficiation Div.), v. 183, 1949, p. 189-203.

Previously abstracted from *Mining Technology*. See item 1a-5, 1948. (B14, Sb, Fe, Cu)

76-B. Attachment of Mineral Particles to Air Bubbles in Flotation. H. Rush Spedden and William S. Hannan, Jr. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 208-213.

Previously abstracted from *Mining Technology*. See item 1a-14, 1948. (B14)

77-B. Flotation of Low Grade Gold Ores at Golden Cycle Corporation. Howard R. Keil. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 214-218.

Previously abstracted from *Mining Technology*. See item 1c-44, 1948. (B14, Au)

78-B. Simultaneous Grinding and Flotation. A. Kenneth Schellinger and O. Cutler Shepard. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 219-224. (B13, B14, Pb, Zn, Cu)

79-B. Notes on Drying for Electrostatic Separation of Particles. Foster Fraas. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 225-238; discussion, p. 238-239.

Previously abstracted from *Mining Technology*. See item 1-157, 1947. (B14)

80-B. The Electrostatic Separation of Several Industrial Minerals. Foster Fraas and Oliver C. Ralston. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 240-250; discussion, p. 250-251.

Previously abstracted from *Mining Technology*. See item 1a-26, 1948. (B14)

81-B. Comparison of Galena and Ferrosilicon in Heavy-Media Separation. E. H. Crabtree, Jr. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 252-256.

Previously abstracted from *Mining Technology*. See item 1-72, 1947. (B14, Pb, Zn)

82-B. A New Separating Vessel for Sink-Float Concentration. E. C. Bitzer. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 257-275; discussion, p. 275.

Previously abstracted from *Mining Technology*. See item 1-73, 1947. (B14)

83-B. Metallurgical Efficiency — A Yardstick in Lead-Zinc Flotation Metallurgy. R. A. Pallanch. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 283-287; discussion, p. 287-288.

Previously abstracted from *Mining Technology*. See item 1-45, 1947. (B14, Pb, Zn)

84-B. A Short-Cut Method of Metallurgical Accounting. E. H. Crabtree, Jr. and Neil S. Parker. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 289-291.

Previously abstracted from *Mining Technology*. See item 1-118, 1947. (B13)

85-B. Crushing Practice at the Braden Copper Company. E. R. Johnson. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 292-298.

Previously abstracted from *Mining Technology*. See item 1-46, 1947. (B13, Cu)

86-B. Rod Milling—Plant and Laboratory Data. J. F. Myers, S. D. Michaelson, and F. C. Bond. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 299-311; discussion, p. 311-312.

Previously abstracted from *Mining Technology*. See item 1-122, 1947. (B13, Cu, Pb)

87-B. Standard Grindability Tests Tabulated. Fred C. Bond. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 313-329.

Previously abstracted from *Mining Technology*. See item 1-121, 1947. (B13)

88-B. Wet Grinding of Ferrosilicon for Heavy Media. E. H. Crabtree and T. C. King. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 361-366.

Previously abstracted from *Mining Technology*. See item 1c-34, 1948. (B13, Fe, Si)

89-B. The Combination Process for Alumina. J. D. Edwards. *Transactions of the American Institute of Mining*

and Metallurgical Engineers (Extractive Metallurgy Division), v. 182, 1949, p. 9-13.

Previously abstracted from *Metals Technology*. See item 1-17, 1945. (B14, Al)

90-B. Alumina From Clay by the Lime-Sinter Method. II. F. R. Archibald and C. M. Nicholson. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Extractive Metallurgy Division), v. 182, 1949, p. 14-38.

Previously abstracted from *Metals Technology*. See item 2d-15, 1948. (B16, Al)

91-B. The Ammonium Sulphate Process for the Extraction of Alumina From Clay and Its Application in a Plant at Salem, Oregon. W. R. Seyfried. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Extractive Metallurgy Division), v. 182, 1949, p. 39-50.

Previously abstracted from *Metals Technology*. See item 1D-1, 1949. (B14, Al)

92-B. The Plant of the Dow Magnesium Corporation at Velasco, Texas. C. M. Shigley. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Extractive Metallurgy Division), v. 182, 1949, p. 59-67.

Previously abstracted from *Metals Technology*. See item 2-54, 1945. (B14, C23, Mg)

93-B. The Refractory or "Fireless Cooker" Method of Producing Magnesium. E. G. De Coriolis. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Extractive Metallurgy Division), v. 182, 1949, p. 93-112.

Previously abstracted from *Metals Technology*. See item 2-16, 1946. (B15, Mg)

94-B. Magnesium From Olivine. E. C. Houston. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Extractive Metallurgy Division), v. 182, 1949, p. 113-126.

Previously abstracted from *Metals Technology*. See item 2-52, 1945. (B14, Mg)

95-B. The Oxidation of Chalcocite in Air Compared With Its Oxidation in Pure Oxygen. J. R. Lewis, J. H. Hamilton, J. C. Nixon, and C. L. Graverson. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Extractive Metallurgy Division), v. 182, 1949, p. 177-185.

Previously abstracted from *Metals Technology*. See item 2C-36, 1948. (B15, Cu)

96-B. The Dithionate Process for Recovery of Manganese From Low-Grade Ores. S. F. Ravitz, W. Wyman, A. E. Back, and K. E. Tame. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Extractive Metallurgy Division), v. 182, 1949, p. 286-295.

Previously abstracted from *Metals Technology*. See item 1-55, 1946. (B14, Mn)

97-B. Concurrent Firing at the Sulphur Bank and Reed Quicksilver Plants. R. G. Hall and W. Bradley. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Extractive Metallurgy Division), v. 182, 1949, p. 296-306.

Previously abstracted from *Metals Technology*. See item 1-4, 1946. (B15, Hg)

98-B. Treatment of Idaho-Wyoming Vanadiferous Shales. S. F. Ravitz, I. W. Nicholson, C. J. Chindgren, L. C. Bauerle, F. P. Williams, and M. T. Martinson. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Extractive Metallurgy Division), v. 182, 1949, p. 307-320.

Previously abstracted from *Metals Technology*. See item 1-74, 1947. (B14, B15, V)

99-B. Operating Practices at the Portsmouth Sinter Plant. Guy B. Hunner. *Journal of Metals*, v. 188, Mar. 1950, p. 471-473.

The Portsmouth sintering operations in the Lake Superior iron ore district. Changes effected to increase daily production from 1123 to 1658 tons. (B16, Fe)

100-B. Iron Ore for Great Britain. H. U. Ross. *Mine & Quarry Engineering*, v. 16, Mar. 1950, p. 80-84.

Emphasis on the new Quebec-Labrador Range. (B10, Fe)

101-B. Today's Iron Ore Sources and Our Future Supply. *Engineering and Mining Journal*, v. 151, Mar. 1950, p. 70-71.

Chart shows the principal sources from which the 10 leading steel companies of the U. S. obtain their iron ore. Prospective future sources. (B10, Fe)

102-B. Low-Cost Production of Zinc Dust From Oxidized Ores. Harry J. Morgan. *Engineering and Mining Journal*, v. 151, Mar. 1950, p. 72-75.

Seven steps in proposed process are calcination at 250-400° C., solution in strong caustic, separation by decantation or filtration, removal of Pb by precipitation, precipitation of Zn sponge, washing and drying Zn dust, and regeneration of spent solution. Experimental work; and alternative methods. (B15, Zn)

103-B. Fluo Solids for Roasting. T. B. Counselman. *Engineering and Mining Journal,* v. 151, Mar. 1950, p. 84-85.

Use of suspended or fluidized solids technique. Developments point toward better control, improved product, and lower cost for roasting or drying sulfides and iron ores. Diagrams show a lime kiln and an ore roaster based on this principle. (B15)

104-B. Exploration to Replenish World Mineral Reserves. Walter Hull Aldridge. *Mining Engineering,* v. 187, Mar. 1950, p. 349-350.

Believes that necessary ores for the foreseeable future will be located. (B10)

105-B. Radiotracer Studies on the Interaction of Dithiophosphate With Galena. G. L. Simard, J. Chupak, and D. J. Salley. *Mining Engineering; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, Mar. 1950, p. 359-364.

The above interaction was shown to have characteristics of both chemisorption and chemical reaction. Sorption was rapid and markedly reversible, and flotation occurred with relatively small amounts of sorbed dithiophosphate. 12 ref. (B14, S19, Pb)

106-B. Experiences With a Density Recording and Controlling Instrument for Heavy-Media Separation Units. James J. Bean. *Mining Engineering; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, Mar. 1950, p. 365-368.

The two installations described employ the usual method of measurement. Pneumatic control with band control and reset features is used to regulate dilution water and hence specific gravity. Difficulties have been mechanical in nature. (B14)

107-B. Behavior of Mineral Particles in Electrostatic Separation. Shiou-Chuan Sun, J. D. Morgan, Jr., and R. F. Wesner. *Mining Engineering; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, Mar. 1950, p. 369-373.

New apparatus termed a "distribution analyzer" for ascertaining optimum conditions of electrostatic separation. 20 ref. (B14)

108-B. Production of Ammonium Sulphate and Manganese Oxides. Norman Ketzlach. *Mining Engineering; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, Mar. 1950, p. 391-394.

Chemical process for recovery of high-grade Mn oxides from low-grade Mn ores. Ammonium sulphate is also produced. Mn ore is leached with H_2SO_3-H_2SO_4 acids. Impurities are removed with NH_3, heat, and air. Mn oxides are produced by addition of more NH_3 and air under pressure. $(NH_4)_2SO_4$ is recovered from the remaining solution. (B14, Mn)

109-B. Relationship of Chemisorptive Activity of Minerals to Their Flotation Properties. (In Russian.) V. A. Glembotskii. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Nov. 1949, p. 1701-1709.

Investigated on the basis of contemporary concepts of heterogeneous catalysis. An attempt was made to establish a relation between chemisorptive activity and particle size. Shows that change of rate of flotation under given conditions characterizes the difference in activity of different particles of the same material. 19 ref. (B14)

110-B. Probable Indices of Separation of Solids. (In Russian.) Z. V. Volkova. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 22, Dec. 1949, p. 1231-1236.

A new method for calculation of the degree of extraction of heterogeneous solids imbedded in a solid matrix (such as rock, ore, etc.) for a given degree of grinding. Formulas derived. (B13)

111-B. Aspects of Commercial Monazite Ore Dressing. (In Portuguese.) Paulo Krumholz. *Boletim da Associaçao Brasileira de Metais,* v. 5, Oct. 1949, p. 545-551.

Modern methods and their applicability under prevailing conditions in Brazil. (B14, Th, EG-g)

112-B. Iron Ore for Great Britain. H. U. Ross. *Canadian Mining Journal,* v. 71, Mar. 1950, p. 59-62.

Previously abstracted from *Mine and Quarry Engineering.* See item 100-B, 1950. (B10, Fe)

113-B. Leaching Process: Recovery of Manganese From Low-Grade Ores. Richard D. Hoak and James Coull. *Chemical Engineering Progress* (Engineering Section), v. 46, Mar. 1950, p. 158-162; discussion, p. 162.

See abstract from *Iron Age,* item 22-B, 1950. (B14, Mn)

114-B. Recent Developments in Research. V. L. Mattson. *Mines Magazine,* v. 40, Mar. 1950, p. 35-36, 56.

Heavy-media separation, carbide rock bits, fluidized-solid roasting and calcining, fluorocarbon compounds, cermets, silicones, new methods for metallurgical analysis, jet-piercing of rock, and new uses for gallium. (B general)

115-B. Minerals' Debt to Man. John D. Sullivan. *Mines Magazine,* v. 40, Mar. 1950, p. 44, 60.

Need for proper timing in metallurgical developments, since expensive methods for recovery of low-grade ores cannot be applied until the high-grade ores become scarce. Belief that advances in prospecting and beneficiating methods will supply the minerals needs of the U. S. in the foreseeable future. (B10)

116-B. Refractories Developments. An International Review of Recent Work and Techniques. F. F. Cordwell. *Refractories Journal,* Feb. 1950, p. 30-35.

(B19)

117-B. Phase Rule Investigation of the System Al_2O_3-SO_3-H_2O at 60°, Basic Region. Jack L. Henry and G. Brooks King. *Journal of the American Chemical Society,* v. 72, Mar. 1950, p. 1282-1286.

Investigated during development of a combined H_2SO_4-H_2SO_3 leaching process for extraction of alumina from clay as an aid in elimination of such impurities as silica, titania, iron, and phosphorus. 20 ref. (B14, Al)

118-B. Modern Foundry Methods: Briquetting Coke Breeze Cuts Melting Costs. *American Foundryman,* v. 17, Mar. 1950, p. 40-42.

Practice as applied by Pontiac Motor Div., General Motors Corp. (B18)

119-B. Investigation of Tungsten Metals Corp. Deposits (Minerva Mining District) White Pine County, Nev. E. W. Newman, Robert W. Geehan, and Russell R. Trengrove. *U. S. Bureau of Mines,* Report of Investigations 4648, Mar. 1950, 13 pages.

Includes flow sheet and description of milling methods. (B10, B13, W)

120-B. Flotation. *Machinery Lloyd* (Overseas Edition), v. 22, Mar. 4, 1950, p. 79-81, 83.

Process, equipment, and applications. (B14)

121-B. The Thermodynamic Properties of Molybdenum and Tungsten Halides and the Use of These Metals as Refractories. L. Brewer, L. A. Bromley, P. W. Gilles, and N. L. Lofgren. "Chemistry and Metallurgy of Miscellaneous Materials — Thermodynamics," Ed. 1, 1950, p. 276-311.

High-temperature chemistry of the metals and their halides. Conditions for nonattack of the metals by halogens, hydrogen halides, and other halogen-producing compounds. Methods of preparing halides and their high-temperature properties. 10 ref. (B19, Mo, W, SG-h)

122-B. Crushing of Single Particles of Crystalline Quartz; Application of Slow Compression. John W. Axelson and Edgar L. Piret. *Industrial and Engineering Chemistry,* v. 42, Apr. 1950, p. 665-670.

Single particles weighing 1-2 g. were crushed in a steel mortar by means of slow compression. Energy input was calculated from force and displacement measurements. Surface areas of the original sample and of the crushed product were determined by gas adsorption. A relationship was found between new surface formed per unit of energy input and energy concentration at fracture. Efficiency of crushing single particles ranged from 1.7 to 26.5%. This compares with 1.4% for multiple particles. Hypotheses are advanced to explain the results. 16 ref. (B13)

123-B. Magnetic Separation of Minerals. Sven Eketorp. *Canadian Metals,* v. 13, Mar. 1950, p. 6-9, 46-47.

25 ref. (B14)

124-B. Extractive Metallurgy of Aluminum. R. S. Sherwin. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Apr. 1950, p. 661-667.

Production of alumina from high-grade ores by the Bayer process, including differences between American and European practice. Brief description of some processes for lower grade ores and for electrolytic reduction of oxide to aluminum. (B14, C23, Al)

125-B. Water Sealed Wind Boxes for Dwight and Lloyd Sintering Machine. E. McL. Tittmann and E. A. Hase. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Apr. 1950, p. 669-670.

Double roasting of sinter carrying a high percentage of lead concentrates, gave rise to the problem of removing the sheets of metallic lead formed in the wind boxes. Solution of the problem was found in use of water-sealed wind boxes. (B16, Pb)

126-B. A New Infrasizer. H. E. T. Haultain. *Canadian Mining and Metallurgical Bulletin,* v. 43, Mar. 1950, p. 128-131; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 53, 1950, p. 78-81.

New type of infra-sizer has only two cones and splits a 25-g. sample into two products in 30 min. The coarser is weighed to give an indication of degree of grinding. (B13)

127-B. Notch Sensitivity and Low-Temperature Spalling of Fireclay Refractories. Ralph Rose and R. S. Brad-

ley. *Industrial Heating,* v. 17, Mar. 1950, p. 504, 506. A condensation.

Previously abstracted from *Journal of the American Ceramic Society.* See item 17-106, 1949. (B19)

128-B. Beneficiation of Adirondack Magnetite. W. R. Webb and R. G. Fleck. *Mining Engineering,* v. 187, Apr. 1950, p. 444-448.

Equipment and procedures of Jones and Laughlin Ore Co., Star Lake, N. Y. Future prospects for the area. (B14, Fe)

129-B. The Critical Decades. Harrison Schmitt. *Mining Engineering,* v. 187, Apr. 1950, p. 449-450.

Mineral-resource position and future prospects for the U. S. during the next decades. Recommendations for governmental actions. (B10)

130-B. Use of an Induced Nuclear Reaction for the Concentration of Beryl. A. M. Gaudin, John Dasher, James H. Pannell, and Wilfred L. Freyberger. *Mining Engineering; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, Apr. 1950, p. 495-498.

A new sorting process for Be minerals depends upon emission of neutrons upon irradiation by gamma rays, a nuclear reaction which is specific for Be at the appropriate energy level. Signals given by neutrons when ore passes on a belt are changed to mechanical commands through amplifiers and other electrical equipment. (B14, S19, Be)

131-B. Concerning the Adsorption of Dodecylamine on Quartz. A. M. Gaudin and F. W. Bloecher, Jr. *Mining Engineering; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, Apr. 1950, p. 499-505.

Using an adsorption-column technique, the partition of dodecylamine between quartz and water was determined for concentrations of 0.5-4000 mg. per liter. The amount adsorbed in a flotation operation giving almost complete recovery is less than 5% of the amount required for a monolayer. 11 ref. (B14)

132-B. Conditioning and Treatment of Sulphide Flotation Concentrates Preparatory for the Separation of Molybdenite at the Miami Copper Company. C. H. Curtis. *Mining Engineering; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, Apr. 1950, p. 506.

(B14, Mo)

133-B. Low Cost Centrifuge Versatile in Laboratory Use. Earl L. H. Sackett. *Mining Engineering,* v. 187, Apr. 1950, p. 466.

Centrifuge built in a local machine shop to serve as a laboratory machine to produce results comparable with those obtained with large-scale centrifugal deslimers. (B14)

134-B. Batch-Test Centrifuge. Earl L. H. Sackett. *Engineering and Mining Journal,* v. 151, Apr. 1950, p. 79-80.

See "Low Cost Centrifuge Versatile in Laboratory Use", *Mining Engineering,* item 133-B, above. (B14)

135-B. How Tonnage and Grade Relations Help Predict Ore Reserves. S. G. Lasky. *Engineering and Mining Journal,* v. 151, Apr. 1950, p. 81-85.

Statistical approach. Why mathematical laws apply to ore deposits. Typical data indicating validity of the method. (B10)

136-B. An Accurate Reagent Feeder for Small Quantities. A. O. Ashman. *Engineering and Mining Journal,* v. 151, Apr. 1950, p. 98-100.

Apparatus for use in pilot-plant flotation tests. (B14)

137-B. The Trend of Iron-Ore Concentration in the Lake Superior District. Edmund C. Bitzer. *Quarterly of the Colorado School of Mines,* v. 45, June 1950, p. 1-5; discussion, p. 5-11.

Trend of concentration practices with respect to the imminent exhaustion of U. S. iron ores. (B14, Fe)

138-B. The Consumption of Balls in Wet-Ball Milling. C. H. Knight and Donald Dyrenforth. *Quarterly of the Colorado School of Mines,* v. 45, Oct. 1950, p. 25-32.

Devaney and Coghill in an analysis of published ball-wear statistics, supported by laboratory tests, have demonstrated that ball wear is proportional to mill power input rather than to tons of ore milled. Their conclusion is supported in this article by additional data from a number of mills, using different types of balls and different ores. (B13)

139-B. Reconnaissance of Metal Mining in the San Juan Region, Ouray, San Juan, and San Miguel Counties, Colo. William H. King and Paul T. Allsman. *U. S. Bureau of Mines,* Information Circular 7554, Mar. 1950, 109 pages.

Includes description of milling methods in an important Au, Ag, Pb, and Zn producing area. Footnote references.

(B10, B13, Ag, Au, Pb, Zn)

140-B. Uranium Recovery at Monticello. M. G. McGrath. *Mining World,* v. 12, Apr. 1950, p. 11-13.

Wartime vanadium plant redesigned to process four types of U-V ores. (B general, U, V)

141-B. U. S., Reds: Ore Resource Rivals. *Steel,* v. 126, Apr. 17, 1950, p. 47-48.

Iron-ore reserves available to U. S. and Russia, also those of other nations not conveniently available. (B10, Fe)

142-B. Mining Methods and Costs at the Highland Surprise Mine, Shoshone County, Idaho. D. W. Butner. *U. S. Bureau of Mines,* Information Circular 7560, Mar. 1950, 11 pages.

Includes section on milling Zn-Pb ore. (B13, Zn, Pb)

143-B. The Use of Borax and Boric Acid as Fluxes in the Metallurgy of Heavy Metals. (In German.) Edmund R. Thews and Martin Stromeyer. *Chemische Technik,* v. 2, Feb. 1950, p. 35-39.

Advantages and disadvantages of different fluxes. Borax and boric acid, mixed with each other or with soda and other substances, are excellent fluxes, especially for the melting of Cu-alloy scrap. (B21, C21, A8, Cu)

144-B. (Book) **Industrial Minerals.** 44 pages. Colorado School of Mines, Department of Publications, Golden, Colo. *Quarterly* of the Colorado School of Mines, No. 4B, v. 45, Oct. 1950. $0.50.

Papers presented at conference on industrial minerals during the 75th Anniversary meetings on "Mineral Resources in World Affairs". Individual papers on metals are abstracted separately. (B10, B14)

145-B. Furnacemen Stress Importance of Ore Beneficiation Practices. *Steel,* v. 126, Apr. 24, 1950, p. 94, 96.

Summarizes proceedings of annual conference of the National Open Hearth Steel Committee and the Blast Furnace, Coke Oven and Raw Materials Committee of AIME, Cincinnati, Apr. 10-12. Includes iron-ore reserves and beneficiation, blast-furnace and openhearth practice. (B10, D1, D2, Fe)

146-B. Theory of Water-Repellent Films on Solids Formed by Adsorption From Aqueous Solutions of Heteropolar Compounds. Melvin A. Cook and John C. Nixon. *Journal of Physical & Colloid Chemistry,* v. 54, Apr. 1950, p. 445-459.

The most important industrial use of this theory is separation of minerals by flotation. 26 ref. (B14)

147-B. Columbium—New Uses and Limited Supply. John Anthony. *Iron Age,* v. 165, Apr. 27, 1950, p. 101-102.

A survey. (B10, T general, Cb)

148-B. Quality of Silica Brick. H. M. Kraner. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32. 1949, p. 211.

General discussion; roof performance. (B19, D2)

149-B. Relative Effect of Alkalis and Alumina on Refractoriness of Silica Brick. L. L. Wells, Jr. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 212-217; discussion, p. 217.

(B19)

150-B. Gold Concentration at the Amalgamated Banket Areas Reduction Plant. G. Chad Norris. *Journal of the Chemical Metallurgical & Mining Society of South Africa,* v. 50, Jan. 1950, p. 152-162; discussion, p. 163-167.

Mechanical methods which have been introduced in place of straking for recovery of free gold. Includes flow and equipment diagrams, and tables. (B14, Au)

151-B. Economic Considerations With Respect to the Sintering of Iron Ore. (In German.) Walter Luyken. *Archiv fur das Eisenhuttenwesen,* v. 21, Jan.-Feb. 1950, p. 1-8.

Detailed cost analysis on the basis of published data. 15 ref. (B16, A4, Fe)

152-B. Mathematical-Physical Relationships in the Sintering of Iron Ore. (In German.) Michael Hansen. *Archiv fur das Eisenhuttenwesen,* v. 21, Jan.-Feb. 1950, p. 9-12.

Effects of various factors such as applied pressure and pressure drop, depth of charge, rate of sintering, etc., on rate of production by the ladle and the moving-belt process. (B16, Fe)

153-B. Slags Containing Silicon Monoxide. (In Russian.) P. V. Gel'd and O. A. Esin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Jan. 21, 1950, p. 473-475.

Proves, by theoretical considerations and by experiments, the presence in ferrous metallurgical slags of SiO as an unstable intermediate phase. (B21, Fe)

154-B. Behavior of Refractory Oxides and Metals, Alone and in Combination, in Vacuo at High Temperatures. P. D. Johnson. *Journal of the American Ceramic Society,* v. 33, May 1, 1950, p. 168-171.

See abstract of "Refractory Reactions in Vacuum" (a condensed version), *Industrial Heating,* item 5B, 1950. (B19, Mo, W, SG-h)

155-B. A New Approach to Taconite Utilization. John J. Howard. *Mining Engineering,* v. 187, May 1950, p.

560-563.

See abstract from *Iron Age,* item 2B-125, 1949. (B16, B17, Fe)

156-B. Oxidized Lead Ore Recovered Profitably. E. V. Given. *Mining Engineering,* v. 187, May 1950, p. 570.

Size-reduction and beneficiation procedures of St. Anthony Mining & Development Co., Tiger, Ariz. Au, Ag, Cu, Pb, and Zn are recovered. (B14, Au, Ag, Cu, Pb, Zn)

157-B. The Burt Filter. W. G. Woolf and A. Y. Bethune. *Mining Engineering,* v. 187, May 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, 1950, p. 585-590.

Filtration of hot (60° C.) supersaturated zinc sulfate solution (sp. gr. 1.540) from slimy leach residues at the electrolytic zinc plant of Sullivan Mining Co., Kellogg, Idaho, using modified Burt filters to meet conditions of the high-acid, high-density process for electrolytic zinc. (B14, Zn)

158-B. Effect of $BaCl_2$ and Other Activators on Soap Flotation of Quartz. R. Schuhmann, Jr., and Brahm Prakash. *Mining Engineering,* v. 187, May 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, 1950, p. 591-600.

Chemical conditions for flotation and nonflotation of quartz with oleic acid as collector and Ba, Ca, Al, Fe, and Sn as activators were studied using a simple vacuum-flotation technique. Study of barium activation led to an interpretation based on Langmuir's chemisorption theory. 11 ref. (B14)

159-B. Effects of Activators and Alizarin Dyes on Soap Flotation of Cassiterite and Fluorite. R. Schuhmann, Jr., and Brahm Prakash. *Mining Engineering,* v. 187, May 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, 1950, p. 601-608.

Chemical conditions for flotation and nonflotation of cassiterite and fluorite with oleic acid as collector and with alizarin dyes as modifying agents were studied by means of small-scale, vacuum-flotation tests. Artificial cassiterite was prepared by high-temperature methods. 12 ref. (B14, Sn)

160-B. Unique Bucketline Dredge Recovers Placer Scheelite. W. A. Noon. *Engineering and Mining Journal,* v. 151, May 1950, p. 82-84.

Flow diagrams for operation of H. & H. Mines, Inc., Drummond, Mont., which recovers tungsten concentrate as well as gold. Also recovered is a high-purity magnetite concentrate suitable for heavy medium in a sink-and-float plant. (B14, Au, W)

161-B. Manufacture of Nodules From Fine Ore and Limestone at Buffalo, N. Y. A. A. Oesterle. *Proceedings Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 8, 1949, p. 132-136; discussion, p. 136-138, 144-145.

A steel company requested the Federal Portland Cement Co. to nodulize approximately 25,000 tons of the byproduct from a chemical company. Layout of plant and the change-over from cement manufacture to nodulizing pyrite. (B16, A8, Fe)

162-B. Manufacture of Nodules at Ironton, Ohio, Using Mesabi Fines and Blast-Furnace Flue Dust. E. F. Brownstead. *Proceedings Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 8, 1949, p. 139-142; discussion, p. 142-145.

Preliminary tests to determine the proper percentages of blast-furnace flue dust, iron ore, and lime flux. Charging of kiln, operation of 8-ft. kilns, and testing of nodules in the openhearth. (B16, Fe)

163-B. Operation and Practice, Producing Iron Sinter at Ducktown and Copperhill, Tennessee, With Fine Flotation Sulphides. R. R. Burns. *Proceedings Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 8, 1949, p. 146-150; discussion, p. 150-157.

Plants layouts, practices, and results. (B16, Fe)

164-B. Briquetting Fine Ores at Woodward, Alabama. H. A. Byrns. *Proceedings Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 8, 1949, p. 158-164; discussion, p. 165-170.

Practice at Woodward Iron Co. in beneficiation of raw material that would cause considerable difficulty if charged to the blast furnaces as mined. (B17, Fe)

165-B. Consolidated Mining and Smelting Company of Canada, Limited. Con Milling Operation, Yellowknife, N. W. T., Canada. R. H. Ross. *Deco Trefoil,* v. 14, Mar.-Apr. 1950, p. 7-22.

Details of mining, milling, and concentration equipment and procedures of above mill for production of gold. (B12, B13, B14, Au)

166-B. Formation of Radioactive Surface Films on Minerals. T. G. Church. *Canadian Journal of Research,* v. 28, sec. A, Mar. 1950, p. 164-167.

Experiments which show that mineral surfaces can be made radioactive by undergoing exchange reactions with radioactive ions in solution. Such radioactive coatings may serve as a means of differentiating between minerals in an ore, and enable them to be separated by a suitable mechanical ore-sorting device actuated by a Geiger counter. (B14, P13)

167-B. Heavy-Media Separation at Algoma Ore Properties. George F. Crocker. *Canadian Mining and Metallurgical Bulletin,* v. 43, Apr. 1950, p. 203-211; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 53, p. 143-151.

Preparation of iron-ore sinter, which is shipped to U. S. and Canadian blast furnaces, at Algoma mill on the north shore of Lake Superior. Equipment dimensions and characteristics, time requirements of the different units, costs, tonnage outputs, metallurgical characteristics. (B14, Fe)

168-B. Recent Improvements at the Sullivan Operations of the Consolidated Mining and Smelting Company of Canada, Limited. E. M. Stiles, E. H. Nagle, and G. J. Knighton. *Canadian Mining and Metallurgical Bulletin,* v. 43, Apr. 1950, p. 212-225; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 53, p. 152-165.

Improved mining, haulage, crushing, and concentration procedures. Includes 12,000-ton-per-day sink-float plant. Pb and Zn concentrates are recovered. (B12, B13, B14, Pb, Zn)

169-B. Concentration of a Lead-Silver Ore From Yerranderie, N.S.W. K. S. Blaskett and H. H. Dunkin. *Commonwealth Scientific and Industrial Research Organization and the University of Melbourne Metallurgical Laboratory* (Joint Investigation). Ore-Dressing Investigation No. 362, July 1949, 17 pages.

Mineralogical examination of head sample, table concentration, and flotation. Data are tabulated and discussed. (B14, Pb, Ag)

170-B. Concentration of a Lead-Silver Ore From a Mine at Mt. Barker, Eungella Mining Field, Q'ld. K. S. Blaskett and H. H. Dunkin. *Commonwealth Scientific and Industrial Research Organization and the University of Melbourne Metallurgical Laboratory* (Joint Investigation). Ore-Dressing Investigation No. 366, June 1949, 10 pages.

Mineralogical examination of head samples, table concentration, and flotation. (B14, Pb, Ag)

171-B. Investigation of a Method of Treatment of an Ore From the Sunshine Reward Amalgamated Near Southern Cross, W. A. Evan E. Hughes and R. A. Hobson. *Commonwealth Scientific and Industrial Research Organization and the Kalgoorlie School of Mines, Kalgoorlie Metallurgical Laboratory. Mines Department of W. A.* (Joint Investigations). Ore-Dressing Report 367, May 1949, 8 pages.

An investigation comparing extractions of Au obtainable by agitation, cyanidation, and percolation cyanidation. (B14, Au)

172-B. Report on Treatment of Selected Ore From the Mountain View Gold Mines, Cue, W. A. Evan E. Hughes, R. W. Wilson, and R. A. Hobson. *Commonwealth Scientific and Industrial Research Organization and the Kalgoorlie School of Mines, Kalgoorlie Metallurgical Laboratory, Mines Department of W. A.* (Joint Investigations). Ore-Dressing Report No. 377, Apr. 1949, 6 pages.

Ore sample, roasting, amalgamation, and cyanidation. (B15, C24, C29, Au)

173-B. The Ionic Lattice Energies of Slag Components. (In Japanese.) Matsushita Yukio and Mori Kazumi. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Oct. 1949, p. 14-16.

Above was calculated for several slag components by two methods. Scratch hardness of $MnO \cdot SiO_2$ and $(MnO)_2 \cdot SiO_2$ were measured and found to be related to lattice energies. (B21, P12)

174-B. Investigation of Oriskany Iron-Ore Deposits Alleghany, Bath, Botetourt, and Craig Counties, Va. G. A. Morrison and W. A. Grosh. *U. S. Bureau of Mines,* Report of Investigations 4668, Apr. 1950, 59 pages.

Screen analyses and log-washing, flotation, roasting, and magnetic separation tests. (B10, B14, Fe)

175-B. Flotation and Cyanidation Tests on a Gold-Copper Sulfide Ore From Cooke, Mont. A. L. Engel and H. J. Heinen. *U. S. Bureau of Mines,* Report of Investigations 4670, Apr. 1950, 9 pages.

Two methods of treatment were developed, giving good recovery of Cu, Au, and Ag with comparatively low consumption of cyanide. (B14, Ag, Au, Cu)

176-B. Investigation of Shawangunk Mine Zinc-Lead Deposit, Near Summitville, Sullivan County, N. Y. N. A. Eilertsen. *U. S. Bureau of Mines,* Report of Investigations 4675, Apr. 1950, 41 pages.

Includes tabulated results of preliminary beneficiation tests. (B10, B14, Zn, Pb)

177-B. Investigation of Nevada Scheelite, Inc., Deposit Mineral County, Nev. Robert W. Geehan and Russell R. Trengove. *U. S. Bureau of Mines.* Report of Investigations 4681, Apr. 1950, 13 pages.

Use of gravity concentration followed by cleaning on magnetic separators for beneficiation. (B14, W)

178-B. Charleson Jig Plant Converts Lean Ore to Iron Concentrate. *Mining World,* v. 12, May 1950, p. 32-34.

Unusual equipment and procedure of Charleson Iron Mining Co., near Virginia, Minn. (B14, Fe)

179-B. The Role of Lime and Finely Dispersed Fractions During Flotation of Several Sulfide Minerals. (In Russian.) I. N. Plaksin and A. M. Okolovich. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Mar. 11, 1950, p. 365-366.

Method of separation by flotation of pyrite and arsenopyrite based on the different mechanisms of depressing action of lime on these minerals. The mixture can be separated by flotation in a lime solution after preliminary activation by $CuSO_4$, using standard frothers and collectors. (B14)

180-B. (Book) **Iron Bearing Deposits in Washington, Oregon and Idaho.** Carl Zapffe. 394 pages. Raw Materials Survey, 701 Woodlark Bldg., Portland 5, Ore. $2.50.

One of a series of reports. A comprehensive review of the quantities and types of ores found in the Pacific Northwest, from the standpoint of their suitability for establishment of large-scale steelmaking and fabricating industries in that region. (B10, Fe)

181-B. Research Studies in Mineral Engineering Using Radionuclides. A. M. Gaudin and P. L. de Bruyn. *Scientific Monthly,* v. 70, June 1950, p. 365-375.

Application of radionuclides to mineral dressing, and particularly to the detailed mechanism of the flotation process of mineral separation. Some typical problems to which this tool is being applied at MIT under the sponsorship of Armour and Co. and the U. S. Atomic Energy Commission. 47 ref. (B14, S19)

182-B. Preparation and Properties of Refractory Cerium Sulfides. E. D. Eastman, Leo Brewer, LeRoy A. Bromley, Paul W. Gilles, and Norman L. Lofgren. *Journal of the American Chemical Society,* v. 72, May 1950, p. 2248-2250.

Methods of preparation, apparatus used, and physical, chemical and thermodynamic properties of the cerium sulfides. Their stability and low reactivity should make them useful as refractories for many applications, especially where it is desirable to prevent oxygen contamination and when dealing with strongly electropositive metals. 13 ref. (B19)

183-B. The Importance of Automatic Sampling: Potentialities and Applications. J. Visman. *Fuel,* v. 29, May 1950, p. 101-105.

Sampling of mineral raw materials used for industrial purposes. Sampling methods for fine and coarse-grained mixtures of particles in which the content of one particular constituent has to be determined with a certain accuracy. Automatic pipe sampler and method for checking calculated accuracy. (B11)

184-B. Refining Zinc-Gold Precipitate at Consolidated Beattie Mines. J. E. Finlay. *Canadian Mining Journal,* v. 71, May 1950, p. 59-66.

Fluxing of cyanide-zinc-gold precipitates. Fundamental concepts pertaining to the fluxing of this type of precipitate and an example of flux calculations for a specific precipitate. Details of refining procedure at the above plant. (B14, Au, Zn)

185-B. Extraction of Copper in Africa. F. D. L. Noakes. *Metal Treatment and Drop Forging,* v. 17, Spring 1950, p. 35-41, 52.

Mining, milling, beneficiation, and smelting procedures. Copper metallurgy in the Belgian Congo. (B12, B13, B14, C21, Cu)

186-B. Viscosity and Fusibility of Slags. (In French.) Paul Kozakevitch. *Revue de Métallurgie,* v. 47, Mar. 1950, p. 201-209; discussion, p. 209-210.

Factors involved and their influence on the smelting process. Experimental data are analyzed and interpreted. 17 ref. (B21)

187-B. Possibilities and Advantages of the Use of Gyratory Crushers in Ore Dressing. (In German.) Edgar

Puffe. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 3, Feb. 1950, p. 41-47; Mar. 1950, p. 75-77.

Critical analysis, including diagrams, tables, and graphs. Advantages of gyratory crushers over other types. (B13)

188-B. The Zinc Sulfide Filtering Process. (In German.) Artur Kutzelnigg. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 3, Mar. 1950, p. 77-82.

Proposed process for separating Au, Os, Ru, Pd, Hg, Ag, Bi, Cu, Fe, As, U, Pt, Rh, and Ir from their salt solutions by filtering them through highly annealed granular ZnS. The process is practically applicable only to the precious and rarer metals. (B14, Ag, EG--a,c,h)

189-B. Mechanism and Rate of the "Collection" Process in Connection With Promotion of the Flotation Process. (In Russian.) V. A. Glembotskii. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Feb. 1950, p. 253-258.

Mechanism of interaction of molecules of collector with mineral surfaces was investigated, taking into consideration non-uniformities of their surfaces, nature of sorption forces, and possible interactions of the collector molecules. (B14)

190-B. Determination of Grain-Size Distribution of Minerals During Investigation of Influence of Composition and Structure of Ores on Their Ability to be Concentrated. (In Russian.) I. N. Plaksin and S. K. Shabarin. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Feb. 1950, p. 259-263.

New graphic method for determining size distribution of disperse minerals. Such characterization may be used for evaluation of ability of ores to be concentrated. (gold ores used as an example). 21 ref. (B14, Au)

191-B. Metallurgical Oxygen Speeds Foundry Open Hearth Melting. L. L. Whitney. *American Foundryman,* v. 17, May 1950, p. 57-59.

Experiences of American Steel Foundries, Alliance, Ohio. (B22, D2, ST)

192-B. Sintering Adirondack Magnetites. W. R. Webb and R. G. Fleck. *Mining Engineering,* v. 187, June 1950, p. 671-672.

Equipment and procedures. (B16, Fe)

193-B. Deposits of Heavy Minerals on the Brazilian Coast. Joseph L. Gillson. *Mining Engineering,* v. 187, June 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, 1950, p. 685-693.

Description includes maps and tabular data. Recoverable products are ilmenite, zircon, and monazite (rare-earth oxides, ThO_2, and CeO_2.) 15 ref. (B10, Ti, Zr, EG-g)

194-B. Progress Report on Grinding at Tennessee Copper Company. J. F. Myers and F. M. Lewis. *Mining Engineering,* v. 187, June 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, 1950, p. 707-711; discussion, p. 711.

Development of a large, slow-speed ball mill closed circuited with a hydroscillator. Grinding efficiency is 28% higher than conventional units. (B13)

195-B. Some Problems in the Sampling of Bulk Materials. Louis Tanner and W. Edwards Deming. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 1181-1186; discussion, p. 1187-1188.

Previously abstracted from *American Society for Testing Materials,* Preprint No. 80. See item 12-141, 1949. (B11)

196-B. Iron Ore in Brazil. (In Portuguese.) Octavio Barbosa. *Mineracao e Metalurgia,* v. 14, Nov.-Dec. 1949, p. 100-101.

Briefly reviews existing iron-ore deposits, indicating locations, types of ore, and proved tonnages. (B10, Fe)

197-B. Cyclone Separator May Be Solution for Fine Iron Ore Problem. Stephen E. Erickson and Earl C. Herkenhoff. *Engineering and Mining Journal,* v. 151, June 1950, p. 71-73.

Process for handling irons of size fractions from 3/16 in. down to 65 mesh, using the Dutch State Mines cyclone separator. Includes flowsheet and tabulated results. (B13, Fe)

198-B. Adirondack Iron Ore Field Still Offers Many Challenges. Donald B. Gillies. *Engineering and Mining Journal,* v. 151, June 1950, p. 84-87.

Includes discussion of ore preparation. (B10, B14, Fe)

199-B. Pacific Isle's North Uno Mill Upgrades Varied Iron Ores. *Mining World,* v. 12, June 1950, p. 12-15.

Iron ore preparation at Pacific Isle Mining Co.'s North Uno mill, Hibbing, Minn. (B14, Fe)

200-B. Philipsburg Manganese. *Mining World,* v. 12, June 1950, p. 16-19.

Taylor-Knapp Co. produces the only battery grade Mn in the U. S.

Ore dressing procedure; includes flowsheet. (B13, B14, Mn)

201-B. Sigman, A Canadian Gold Mine. A. G. G. Oliver. *Mine & Quarry Engineering,* v. 16, June 1950, p. 183-188.

Includes mill flowsheet. (B12, B13, Au)

202-B. Flowsheet for Tungsten Ore. *Deco Trefoil,* v. 14, May-June 1950, p. 15-16.

Process which recovers a high-grade concentrate from an initial coarse, unclassified feed, with a minimum amount of slimes. (B14, W)

203-B. Basic Refractories; Their Chemistry in Relation to Their Performance. (Continued.) J. R. Rait. *Iron and Steel,* v. 23, May 11, 1950, p. 183-189.

Deals with the system CaO-MgO-SiO_2-Al_2O_3-Fe_2O_3. (To be continued.) (B19)

204-B. The Trend in Mineral Dressing. F. B. Mitchell. *Mining Journal* (Annual Review Number), May 1950, p. 73, 75, 77, 79.

A review. (B13, B14)

205-B. Some Recent Work on Flotation. Graham Oldham. *Mining Journal* (Annual Review Number), May 1950, p. 81, 83-84.

A review. 27 ref. (B-14)

206-B. Geology of the Fissionable Materials. George W. Bain. *Economic Geology and the Bulletin of the Society of Economic Geologists,* v. 45, June-July 1950, p. 273-323.

Deposits of uranium and thorium have characteristics of mineralogy and geologic occurrence with geographic distribution pattern that facilitate estimating the resources of each type. Aggregate abundance in the earth is about that for tin; and theoretical difficulty of recovery from large deposits would appear to be slightly less than for silver. At present the primary deposits are the principal source of supply. For the future, all varieties of sedimentary occurrences give promise of large sustained production at reasonable cost. 162 ref. (B10, U, Th, EG-h)

207-B. Carbon Disintegration Test for Blast Furnace Fire Brick. *Industrial Heating,* v. 17, June 1950, p. 1056, 1058, 1065. Condensed from paper by Louis J. Trostel.

Apparatus and procedure. (B19)

208-B. The Beneficiation of Southern Iron Ores. E. H. Rose. *Mining Congress Journal,* v. 36, May 1950, p. 32-35, 60; June 1950, p. 44-47, 83.

See abstract of "Beneficiation Methods for Southern Iron Ores", *American Iron and Steel Institute,* "Technical Committee Activities." See item 32-B, 1950. (B14, Fe)

209-B. A Gold Treatment Plant. *Engineer,* v. 189, June 2, 1950, p. 654-655.

Diagrams show floor plan and elevation of plant in operation at the El Sid mine in Egypt. Crushing, ball milling, classification, amalgamation, and cyanidation are the principal operations. (B13, C24, C29, Au)

210-B. The System Gehlenite-Spinel; Relation to the Quaternary System CaO-MgO-Al_2O_3-SiO_2. R. W. Nurse and N. Stutterheim. *Journal of the Iron and Steel Institute,* v. 165, June 1950, p. 137-138.

Experimental data. The above systems occur in blast-furnace slags. (B21, D1, Fe)

211-B. Amalgamation, Cyanidation and Filtering Tests on an Ore From G.M.L. 5767, Red Ridge, Coolgardie, W. A. Arnold Griffin, Evan E. Hughes, and R. A. Hobson. *Commonwealth Scientific and Industrial Research Organization and Kalgoorlie School of Mines* (Joint Investigations), Report No. 338, Aug. 19, 1949, 5 pages.

With respect to recovery of gold from the ore. (C24, C29, B14, Au)

212-B. Treatment of an Ore From Gabanintha by Flotation and Gravity Concentration. Arnold Griffin, Evan E. Hughes, and R. A. Hobson. *Commonwealth Scientific and Industrial Research Organization and Kalgoorlie School of Mines* (Joint Investigations), Report No. 413, Aug. 30, 1949, 7 pages.

Recovery of Au and Cu from the ore. (B14, Au, Cu)

213-B. Experience With the Flotation of Cassiterite. A. Graham Thomson. *Mining Journal,* v. 234, June 16, 1950, p. 625-627.

Reviews work of past 10-12 years. (B14, SN)

214-B. Present and Prospective Sources of Supply of Steel Making Raw Materials. C. C. Henning and R. W. Braund. *Blast Furnace and Steel Plant,* v. 38, July 1950, p. 804-806, 844. (B10, Fe)

215-B. Investigation of Smuggler Lead-Zinc Mine, Aspen, Pitkin County, Colo. M. E. Volin and J. H. Hild. *U. S. Bureau of Mines,* Report of Investigations 4696, June 1950, 47 pages.

Results of beneficiation tests. (B10, B14, Pb, Zn)

216-B. The Rarer Metals. W. H. Dennis. *Mine & Quarry Engineering,* v. 16, June 1950, p. 173-178; July 1950, p. 211-215.

Sources and preparation of Li, Cs,

Rb, Be, In, Tl, and Th. Second part deals with Zr, Ge, Ta, Cb, Se, and Te. (B general, EG-b)

217-B. Recent Progress in Refractories. II. Magnesia. J. H. Chesters. *Ceramic Age,* v. 55, June 1950, p. 396, 398.

Second of series. Fundamental developments and practical applications, particularly to the openhearth and other metallurgical furnaces. (B19, D2)

218-B. The Present Status of the Suspension Roasting Process. (In German.) Gotthard Björling. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 3, Apr. 1950, p. 111-115.

Suspension and flash roasting of iron ore. (B15, Fe)

219-B. Critical Investigation of Classification of the Process in Rake Classifiers. (In German.) Günther Flügge. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 3, Apr. 1950, p. 116-121.

Object of experimental study was to find generally valid principles. A new "flow-number" formula can be used to determine optimum operating conditions. A new "slotted" baffle wall which increases the efficiency of the classifier about 75%. (B13)

220-B. Influence of Grain Characteristics in Flotability of Zinc Blende in Connection With Auto-Activation. (In Russian.) I. N. Plaksin, G. N. Khazhinskaya, and T. F. Brovkina. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Mar. 1950, p. 407-411.

Above was experimentally investigated for zinc blende ground to −100, −200, −250, and −325 mesh and containing 50.44% Zn, 0.23% Cu, and 7.64% Fe, using $CuSO_4$ as activator and lime as frother. (B14, Zn)

221-B. Influence of Frothing Agent on Air Content of Flotation Pulp. (In Russian.) O. S. Bogdanov, B. V. Kizeval'ter, and S. G. Maslova. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Mar. 1950, p. 412-416.

Investigation revealed that a frothing agent influences the concentration of air in the pulp, on the one hand, by decreasing the rate of ascent of the bubbles and, on the other hand, by preventing their coalescence. Experimental apparatus. (B14)

222-B. Laboratory Experiments on Beneficiation of Brown Hematite by Means of Heavy-Liquid Separation. (In Russian.) V. I. Lukashin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Apr. 11, 1950, p. 919-920.

Results of investigation for a hematite ore containing 33.48% Fe, 20.67% SiO_2, 10.74% Al_2O_3, and 2.55% CaO + MgO, using a heavy liquid of specific gravity 3.2. (B14, Fe)

223-B. How Getchell Mine and Mill Prepare for Greater Output. John B. Huttl. *Engineering and Mining Journal,* v. 151, July 1950, p. 60-62.

Major changes in mine and mill for processing 1500 tons per day of sulfide gold ore. Includes flowsheet of crushing, grinding, classification, beneficiation, cyanidation, etc. (B general, Au)

224-B. Heavy-Density Separation Cuts Brown Ore Treatment Cost. S. A. Britton. *Engineering and Mining Journal,* v. 151, July 1950, p. 68-70.

Limonite, previously rejected because of low yield and high insoluble content, can now be beneficiated economically. (B14, Fe)

225-B. Clean Design Features New C & H Lead-Zinc Mill. I. V. Korts and O. W. Walvoord. *Engineering and Mining Journal,* v. 151, July 1950, p. 78-81.

New mill of Calumet and Hecla Consolidated Copper Co., at Shullsburg, Wis. Includes flow diagrams. (B13, Pb, Zn)

226-B. Recent Progress in Refractories. J. H. Chesters. *Research,* v. 3, July 1950, p. 303-309.

A survey. 27 ref. (B19)

227-B. Protective Action of Ammoniacal Compounds During Selective Flotation of Pyrite and Arsenopyrite. (In Russian.) *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 72, May 1, 1950, p. 97-99.

Investigated using ammonium carbonate, nitrate, or chloride as additives during flotation tests on a synthetic mixture of arsenopyrite and pyrite of 1-3 ratio. Tabulated data indicate that the highest extraction of arsenopyrite (92-93%) was achieved when NH_4Cl was used (5 kg. per ton). (B14)

228-B. (Book) **Hochofen-Schlacke.** (Blast-Furnace Slags.) Fritz Keil. 346 pages. Stahleisen, Dusseldorf, Germany. 32.50 marks.

Slags of all types and compositions. Differences between the properties of blast furnace and other slags are emphasized. Production and utilization of quickly cooled slag; production of granulated slag, its use for cement, for brick-making, and for the making of slag-pumice stone. Miscellaneous products and uses, such as production and use of slag wool, use of slag as fertilizer,

as filler for worked-out sections of mines, and as ingredient in the making of glass. Extensive bibliography. (From review in *Chemical Engineering.)* (B21, D1)

229-B. Sink-Float at the Sullivan Concentrator. H. R. Banks. *Mining Congress Journal,* v. 36, July 1950, p. 28-31.

Equipment and procedures of Pb-Zn concentrator of Consolidated Mining & Smelter Co. of Canada. Includes flow diagram. (B14, Pb, Zn)

230-B. Studies of Recovery Processes for Western Uranium Bearing Ores. Part VII. Wet Concentration. David J. Crouse. *U. S. Atomic Energy Commission,* AECD-2849, Dec. 6, 1949, 33 pages.

Scrubbing by stirring and by ball milling with and without grinding media; effect of surface-active agents; and further processing of slimes and sands from a concentrating process. (B13, B14, U)

231-B. Sources of Britain's Platinum; Rich Yields From South Africa's Deposits. *Chemical Age,* v. 63, July 1, 1950, p. 21-22.

(B10, Pt)

232-B. Metal-Monolayer Interactions in Aqueous Systems. Part I. The Interaction of Monolayers of Long-Chain Polar Compounds With Metal Ions in the Underlying Solution. Part II. The Adsorption of Long-Chain Compounds From Aqueous Solution onto Evaporated Metal Films. G. A. Wolstenholme and J. H. Schulman. *Transactions of the Faraday Society,* v. 46, June 1950, p. 475-497.

In Part 1, effects on mechanical properties of myristic acid monolayers, produced by the presence of salts of Fe, Al, Cu, Co, Mn, Ca, and Mg in the underlying solution were investigated. In part II, evaporated films of Cu and Ag on hydrophilic surfaces were immersed in aqueous solutions of surface-active long-chain compounds, and contact angles with these solutions measured under controlled conditions. 34 ref. (B14, P10, P13)

233-B. Utilizing Dolomite for Heroult Electric-Furnace Linings. (In Japanese.) **Fujio Takahashi and Kazuhiko Yamanouchi.** *Journal of the Casting Institute of Japan,* v. 21, no. 1, 1949, p. 10-13.

Use of raw dolomite instead of magnesia clinker. (B19, D5)

234-B. Experimental Use of "Chamotte" Refractories in the Roofs of Heroult Electric Furnaces. (In Japanese.) T. Kinoshita and H. Koga. *Journal of the Casting Institute of Japan,* v. 21, No. 3, 1949, p. 2-4.

Investigated because of wartime shortages. Use was found feasible in spite of disadvantages. Some silica blocks are still used in strategic locations. (B19, D5)

235-B. Cyclone Proves Satisfactory for Thickening, Desliming Flotation Feed. Robert L. Kingman. *Mining Engineering,* v. 187, Aug. 1950, p. 867-870.

Experimental work on the Dutch State Mines Cyclone for thickening and desliming flotation feed at the concentrator of the National Lead Co., Tahawus, N. Y. (B14)

236-B. A New Theory of Comminution. Fred C. Bond and Jen-Tung Wang. *Mining Engineering,* v. 187, Aug. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, 1950, p. 871-878.

An empirical equation is presented which covers the entire comminution range. The new strain-energy theory considers comminution from the known principles of mechanics and the reduction ratio. Energy requirements according to the different theories are compared. 18 ref. (B13)

237-B. An Improved Method of Gravity Concentration in the Fine-Size Range. Arvid Thunaes and H. Rush Spedden. *Mining Engineering,* v. 187, Aug. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, 1950, p. 879-882.

Pilot-plant test work in 1942 and 1943 showed that by a combination of desliming, fine-size classification, and Sullivan deck concentration it is possible to recover heavy minerals such as cassiterite at least as fine as 10 microns in size. This appreciable improvement in gravity concentration practice has been substantiated by several full-sized plants. Data are for Bolivian tin ores. (B14, Sn)

238-B. High Grade Iron Ore From Low Grade Deposits. R. W. Hedges. *Iron Age,* v. 166, Aug. 3, 1950, p. 79-84.

Heavy-media separation process being more and more extensively used in the Lake Superior region. Costs and economic significance. 12 ref. (B14, A4, Fe)

239-B. Cerro Bolivar—U. S. Steel's New Iron Ore Bonanza. Mack C. Lake. *Engineering and Mining Journal,* v. 151, Aug. 1950, p. 72-83.

Discovery, geology, probable origin, and plans for exploitation of above iron-ore discovery in Venezuela. 11 ref. (B10, Fe)

240-B. The Humphreys Spiral—Some Present and Potential Applications. James V. Thompson and Whitman E. Brown. *Engineering and Mining Journal,* v. 151, Aug. 1950, p. 87-89.

The place in mineral dressing won by the spiral; suggests new flowsheets where it might well be used. (B14)

241-B. Ferromanganese From Anaconda. *Mining World,* v. 12, Aug. 1950, p. 15-17.

How rhodochrosite from Anaconda's mines near Butte, Mont., is concentrated by soap flotation, calcined, nodulized, and smelted to ferromanganese.
(B14, B15, B16, C21, Fe-n, Mn)

242-B. Cleveland-Cliffs Iron Company Uses Separator on Trumbull Ore. *Mining World,* v. 12, Aug. 1950, p. 37, 39.

The first commercial application of a Hardinge heavy media separater to low-grade iron ore at the Hill Trumbull operation of the Cleveland-Cliffs Iron Co., near Taconite, Minn. (B14, Fe)

243-B. Recent Progress in Refractories. III. Dolomite. IV. Chrome and Chrome-Magnesite. J. H. Chesters. *Ceramic Age,* v. 56, July 1950, p. 22, 25-27.

Particularly as used in steelmaking furnaces. 10 ref.
(B19, D general)

244-B. Studies of Recovery Processes for Western Uranium Bearing Ores. Part V. Tests of Specific Leaching of Carnotite Ores. C. F. Coleman. *U. S. Atomic Energy Commission,* AECD-2846, Oct. 31, 1949, 14 pages.

Briefly describes tests and results.
(B14, U)

245-B. Ore Dressing Problems of the Sontra Copper Schists. (In German.) Johann Petri. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 3, Jan. 1950, p. 6-14.

Methods developed for beneficiating this ore. Several mechanical processes and flotation methods were tried without success. Only an electrostatic method gave satisfactory results. Details of the latter, including pilot-plant flow sheet.
(B14, Cu)

246-B. Comparative Consideration of Zinc Production Methods Now in Use. (In German.) Walther Hänig. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 3, Jan. 1950, p. 22-26; Feb. 1950, p. 55-58.

Various methods of extracting Zn from its ores.
(B general, C general, Zn)

247-B. Measuring Technique in the Blende Roasting Plant. (In German.) Willi Gehrhardt. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 3, June 1950, p. 182-190.

Instrumentation for measurement and control in the roasting of ores. Includes diagrams, chart records, and tables of typical data. (B15)

248-B. Possible Annual Production of Steep Rock Iron Ore Seen as 10 Million Tons. Dan Reebel. *Steel,* v. 127, Aug. 21, 1950, p. 88-93, 110.

Detailed survey, including maps and illustrations, of iron-ore resources of Ontario deposit. Diversion of river and pumping-out of lake was necessary before recovery of the ore could be begun on a large scale.
(B10, Fe)

249-B. Gold Recovery in Some Ontario Mills. E. J. Pryor. *Mining Magazine,* v. 82, Mar. 1950, p. 137-143.

Practice at several gold mines in the Kirkland Lake and Timmins districts. Includes flow diagrams.
(B14, Au)

250-B. Progress in Size Reduction. Graham Oldham. *Mining Magazine,* v. 82, May 1950, p. 279-280.

Reviews recent literature. 21 ref.
(B13)

251-B. (Book) Economic Mineral Deposits. Ed. 2. Alan M. Bateman. 916 pages. 1950. John Wiley & Sons, 440 Fourth Ave., New York 16. $7.50.

A textbook for both elementary and advanced courses. Principles and processes of formation of mineral deposits. Metallic and nonmetallic occurrences and their use.
(B10)

252-B. Polarography in Fused Salts. Martin Steinberg and Norman H. Nachtrieb. *Journal of the American Chemical Society,* v. 72, Aug. 1950, p. 3558-3565.

Typical polarographic waves were obtained for reduction of a number of cations at the dropping mercury electrode in a melt of Li, Na, and K nitrates. The Ilkovic equation was found to apply to the reduction of divalent Ni, Pb, Cd and Zn^{++} in the ternary nitrate melt at 160° C. Theory of the current-voltage relation was experimentally confirmed in the nitrate melt for the above cations. Attempts to operate dropping electrodes of pure Pb and Bi in a molten LiCl-KCl melt were unsuccessful. Dropping molten Ag electrodes gave no useful polarograms in NaCl or borax at 1000° C. Ultimate objective is development of a polarographic technique for study of reactions in metallurgical slags and molten glasses. 20 ref. (B21, S11)

253-B. Effect of Boron Upon the Properties of Steel. *Industrial Heating,* v. 17, Aug. 1950, p. 1348, 1450. Condensed from "Effect of Boron and Kind of Boron Addition Upon the Properties of Steel", R. A. Grange, W. B. Seens, W. S. Holt, and T. M. Garvey.

Previously abstracted from *American Society for Metals,* Preprint No. 5, 1949. See item 3B-196, 1949. (B22, Q27, Q6, J26, ST)

254-B. How Much Iron Ore in Brazil? Part I, II. John Van N. Dorr. *Iron Age,* v. 166, Aug. 17, 1950, p. 81-84; Aug. 24, 1950, p. 79-82.

A report on the basis of a joint long-term study by the Brazilian National Department of Mineral Production and the U. S. Geological Survey. (B10, Fe)

255-B. The Use of the Oxygen Lance in British Electric Furnace Practice. Part I. The Use of Oxygen for the Production of Low-Carbon Alloy Steels Other Than High-Chrome Steels. T. H. Harris and D. J. O. Brandt. **Part II. The Use of Oxygen Lance in Stainless Steel Production.** W. H. Everard and D. J. O. Brandt. *Journal of the Iron and Steel Institute,* v. 165, Aug. 1950, p. 399-418.

Part I: Technique during the boiling-down period and typical results on both high-carbon and low-carbon charges. Effect of oxygen on residual Mn; possible rise in temperature during oxygen injection; lance life. Part II; technique and details of carbon reduction and chromium loss. The physical chemistry; alteration of composition and temperature during oxygen injection. The log sheet of a typical heat is included. 11 ref. (B22, D5, AY, SS)

256-B. Concentration of Iron Ore by Magnetic Roasting. (In French.) V. I. Karmazine. *Centre de Documentation Sidérurgique, Circulaire d' Informations Techniques,* v. 7, Jan.-Feb. 1950, p. 11-31. Translated from *Gornyi Zhurnal* (Mining Journal), v. 120, Nos. 9-10, 1946, p. 28-35.

Method which has been practically applied to several iron deposits of the Donets Basin. It is particularly recommended for quartzite ores Theoretical bases; flow sheets; equipment. 13 ref. (B15, Fe)

257-B. New Methods and Possibilities in the Metallurgy of Cuprous Roasted Pyrites. (In German.) Friedrich Vogel. *Chemische Technik,* v. 2, May 1950, p. 161-163.

Instead of the older method of chlorination, preliminary removal of the iron from the waste formed during production of H_2SO_4 is recommended. The Fe content of the pyrites is reduced to sponge iron and separated from the desired Cu, Ni, Co, Zn, precious metals, etc., by magnetic separation, carbonyl formation, or solution in mineral acids. Details for pyrites containing other metals besides Cu. (B14, C1, A8, Cu)

258-B. Present and Prospective Sources of Supply of Steelmaking Raw Materials. Part II. C. C. Henning and R. W. Braund. *Blast Furnace and Steel Plant,* v. 38, Aug. 1950, p. 908-911.

Completes survey. 20 ref. (B10, Fe)

259-B. Present and Prospective Sources of Supply of Steelmaking Raw Materials. C. C. Henning and R. W. Braund. *Year Book of the American Iron and Steel Institute,* 1950, p. 251-270; discussion, p. 271-273.

Previously abstracted from *Blast Furnace and Steel Plant.* See items 214-B and 258-B, 1950. (B10, Fe)

260-B. Taconites Are Ready. John V. Beall. *Journal of Metals,* v. 188, Sept. 1950, p. 1087-1088.

Commercial status and plans of various companies for taconite utilization in the near future. One of the factors that makes the mining of taconites economic and feasible is the development of Linde Air Products Co.'s jet-piercing drill. Includes cost analysis. (B12, Fe)

261-B. The Mechanism of Sulphur Transfer Between Carbon-Saturated Iron and CaO-SiO_2-Al_2O_3 Slags. G. Derge, W. O. Philbrook, and Kenneth M. Goldman. *Journal of Metals,* v. 188, Sept. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1111-1119.

Shows experimentally that area of the slag-metal interface is a rate-determining factor in the transfer of S from Fe to CaO-Al_2O_3-SiO_2 slags in a carbon-saturated system. Concentration gradients are removed by convection rather than diffusion. The S crosses the interface in chemical combination with Fe which is later reduced to pellets, accompanied by evolution of CO and formation of a stable Ca-S compound in the slag. 16 ref. (B21, Fe)

262-B. The Use of Spiral Classifiers as Ball Mill Feeders. T. C. King. *Mining Engineering,* v. 187, Sept. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, 1950, p. 951.

Practice at new Graham-Central Mill of Eagle-Picher, near Galena, Ill. (B13)

263-B. Flotation of Residues From the Wimmera Dump, Stawell, Vic. K. S. Blaskett and H. H. Dunkin. *Council for Scientific and Industrial Research and the University of Melbourne Metallurgy Department,* Joint Investigation No. 335, Oct. 26, 1948, 2 pages.

The recovery of gold. (B14, Au)

264-B. Concentration of Tin Ore From Ardlethan, N.S.W. K. S. Blaskett and H. H. Dunkin. *Commonwealth Scientific and Industrial Research Organization and the University of Melbourne Metallurgy Department,* Joint Investigation No. 374, Dec. 22, 1949, 6 pages.

Procedure for investigating the concentration problem. (B14, Sn)

265-B. Cyanidation, Settlement and Filtration of a Sample From the Black Horse Dump, Egerton, Victoria. K. S. Blaskett and H. H. Dunkin. *Commonwealth Scientific and Industrial Research Organization and the University of Melbourne, Metallurgy Department,* Joint Investigation No. 380, Jan. 4, 1950, 4 pages.

Investigation of the above for gold. (B14, Au)

266-B. Decrease of Concentration of Phosphorus in High-Manganese Flux During Its Melting in Flame Furnaces. (In Russian) M. M. Timofeev and A. G. Minakov. *Avtogennoe Delo* (Welding), v. 21, June 1950, p. 23-24.

Experimental investigation of conditions of production of high-Mn fluxes reveals the possibility of introducing cast iron into the furnace to decrease the P content of fluxes from 0.15 to 0.09%, i.e., 40%. Data are tabulated and charted. (B21)

267-B. Fundamental Factors Influencing the Strength of Green and Burned Pellets Made From Fine Magnetite-Ore Concentrates. (In Swedish.) P. A. Ilmoni and Magnus Tigerschiöld. *Jernkontorets Annaler,* v. 134, no. 4, 1950, p. 135-171.

Results of laboratory investigations carried out at Mines Experiment Station of the Institute of Technology, Stockholm. By improvements in the balling method it was possible to produce pellets of spherical shape and uniform dimensions. Apparatus by which crushing strength of the green pellets can be measured with good accuracy. A series of runs with pellets made from concentrates of various fineness and different water contents was made. A working hypothesis for the results obtained in the balling operation. Mechanism of the drying and burning operation. 10 ref. (B16, Fe)

268-B. Investigation of Calcined Pyrites Containing Zinc. (In Polish.) **Part II. Agglomeration of Calcined Pyrites by Sintering.** St. Holewinski and Wl. Madej. **Part III. Volatilization of Zinc During Sintering of Calcined Pyrites.** M. Smialowski and J. Niewiadomski. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 2, no. 2, 1950, p. 101-110.

Part II: Sintering tests using the down-draft method on pyrites containing 47.38% Fe and 8.51% Zn. Shows that difficulties in the sintering process are mainly due to small particle size. Satisfactory results were obtained by adding 20% slag from rotary kilns. Part III: Removal of Zn by the down-draft sintering process. Pb and S were largely removed, but the amounts of Zn and As remaining were too large for successful application of the method. (B16, Zn, Fe)

269-B. Blackburn Heavy - Density Plant Opens New Brown Iron Ore Reserves. Alfred M. Shook. *Engineering and Mining Journal,* v. 151, Sept. 1950, p. 78-81.

Treatment plant of Shook and Fletcher Supply Co., at Blackburn mine near Russellville, Ala. Includes flowsheet. (B10, Fe)

270-B. A Glossary of Uranium- and Thorium-Bearing Minerals. Judith Weiss Frondel and Michael Fleischer. *U. S. Geological Survey,* Circular 74, Apr. 1950, 20 pages.

(B10, A10, U, Th)

271-B. Summary Account of Canadian Uranium Deposits. A. H. Lang. *Canadian Mining and Metallurgical Bulletin,* v. 43, Aug. 1950, p. 426-433; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 53, p. 289-296.

16 references. (B10, U)

272-B. Possibilities and Limitations of Gravity Concentration as Applied to Pitchblende Ores at Port Radium, N.W.T. E. B. Spice. *Canadian Mining and Metallurgical Bulletin,* v. 43, Aug. 1950, p. 446-449; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 53, p. 309-312.

Ore characteristics, present concentration flowsheet, and future prospects. (B14, U)

273-B. The Radiogenic Concentration of Uranium Ores. L. A. Kaufman. *Canadian Mining and Metallurgical Bulletin,* v. 43, Aug. 1950, p. 450-453; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 53, p. 313-316.

"Electronic" concentrator developed by Canadian Bureau of Mines

and Eldorado Mining and Refining Co. Separation is based on response of a Geiger counter, since relationship between Geiger count and U_3O_8 content is approximately linear for the same size pieces of ore. Jig concentrate ¼ to 1 in. moves in "single file" along a 2-in. belt past the Geiger tube. If the lump is sufficiently active, a "kicker" is activated, which knocks the piece of ore off the belt into a chute. (B14, U)

274-B. Concentration and Extraction of Uranium From Several Types of Canadian Ores. *Canadian Mining and Metallurgical Bulletin,* v. 43, Aug. 1950, p. 454-460; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 53, p. 317-323.

Paper by staff of Radioactivity Division, Mines Branch, Department of Mines and Technical Surveys, Ottawa, Canada. Tables, flow diagrams, radiographs, and micrographs. (B14, U)

275-B. Recent Progress in Refractories. V. Aluminio-Silicates. VI. Carbon. VII. Super-Refractories. J. H. Chesters. *Ceramic Age,* v. 56, Aug. 1950, p. 24, 26-27; Sept. 1950, p. 16-17.

Developments and applications to industry. (B19)

276-B. (Book) **Refractories.** James R. Coxey. 162 pages. 1950. Pennsylvania State College, State College, Pa. $2.50.

A textbook designed to provide a practical background in refractories for operating plant personnel, engineers, and metallurgists. Properties, classification, manufacture, and testing of refractories. Analysis of the various types of refractories, as they apply to the glass, metallurgical, lime and cement, and other industries. (B19)

277-B. Indium From Rammelsberg Ores. R. Kleinert. *Mining Magazine,* v. 83, Sept. 1950, p. 146-151. A Translation.

Previously abstracted from *Zeitschrift für Erzbergbau und Metallhüttenwesen.* See item 1C-31, 1949. (B14, In)

278-B. The Composition of CaO-FeO-Fe_2O_3 and MnO-FeO-Fe_2O_3 Melts at Several Oxygen Pressures in the Vicinity of 1600°. R. W. Gurry and L. S. Darken. *Journal of the American Chemical Society,* v. 72, Sept. 1950, p. 3906-3910.

Analysis of above melts equilibrated in various atmospheres was used to determine oxygen activity at several levels over the liquid fields in these slag systems. From these and other data tentative equilibrium diagrams at 1600° C. were constructed for these systems and also for the SiO_2-FeO-Fe_2O_3 system. (B21, Fe)

279-B. Deming—1950 Lead-Zinc Mill. *Mining World,* v. 12, Sept. 1950, p. 27-31.

American Smelting and Refining Co.'s new mill at Deming, New Mexico, illustrates use of automatic control of modern equipment in a pre-engineered plant. (B13, B14, Pb, Zn)

280-B. Tin Ore Dressing in Cornwall. F. B. Michell. *Mining World,* v. 12, Sept. 1950, p. 34-35, 37.

How finely disseminated cassiterite is recovered from complex ores by gravity and flotation processes at the mills of the Geevor and South Crofty mines. (B14, Sn)

281-B. Sink-Float at the Sullivan Concentrator. H. R. Banks. *Mining Journal,* v. 235, Sept. 1, 1950, p. 203-205.

Processes at Canadian Pb-Zn mill. (B14, Pb, Zn)

282-B. Extraction of Copper in Africa; Northern Rhodesia, Namaqualand and Transvaal. F. D. L. Noakes. *Metal Treatment and Drop Forging,* v. 17, Summer 1950, p. 83-92.

Flow diagrams and illustrations cover ore beneficiation and metal production. 10 ref. (B14, C21, Cu)

283-B. A New Ball Mill. (In German.) W. Schotten. *Metall,* v. 4, July 1950, p. 276-278.

Mill which moves up and down instead of rotating. Impact values are calculated for specific conditions. (B13)

284-B. The Adhesion Process in Flotation. (In German.) W. Finn. *Chemische Technik,* v. 2, June 1950, p. 173-178.

Recent research on flotation in which air bubbles adhering to heavier-than-water particles raise the latter to the surface of the water. Lattice structures of different minerals. Correlations discovered explain the similar flotation behavior of such unlike substances as graphite, sulfur, talc, etc. Includes molecular-model diagrams. (B14)

285-B. Problems in Wet Mechanical Ore Dressing in Calbecht. (In German.) Arnold Goltz. *Stahl und Eisen,* v. 70, June 8, 1950, p. 505-506.

A process for dressing iron ore which has a very high SiO_2 and aluminum clay content. The proposed process can also be used for dressing hard "deep-mine" ores. Methods of processing the sludges and of dehydrating the concentrates. (B13, B14, Fe)

286-B. The Electrical Conductivity of Slags in the Solid and Liquid States. (In German.) Wilhelm Anton Fischer and Hans vom Ende. *Archiv für das Eisenhüttenwesen,* v. 21, July-Aug. 1950, p. 217-224.

A special apparatus was used to record the temperature-resistance curves of different slags associated with ferrous metallurgy in the range of about 200-1400° C. Measured resistances varied widely below the melting point. The slags differ in that some exhibit unipolar, some bipolar, ionic conduction. 17 ref. (B21, D general, Fe)

287-B. Oxidation of Magnetite Concentrates. John D. Zetterstrom. *U. S. Bureau of Mines,* Report of Investigations 4728, Sept. 1950, 8 pages.

Apparatus. Procedure and variables affecting oxidation. Results. (B14, Fe)

288-B. Mining and Milling Methods at San Xavier Mine, The Eagle-Picher Mining & Smelting Co., Pima County, Ariz. Grover J. Duff and Charles A. Kumke. *U. S. Bureau of Mines,* Information Circular 7581, Sept. 1950, 13 pages.

Pb-Zn selective flotation, producing a Pb concentrate containing Ag and Cu and a Zn concentrate. Crushing apparatus. (B14, Pb, Zn)

289-B. Munitions Board's Policy Is To Accelerate Program of Stockpiling Strategic Metals. Carl Rolle. *Metals,* v. 21, Sept. 1950, p. 10-12.

Address by assistant to chairman on stockpiling, Munitions Board. (B10)

290-B. Screw Crusher Solves Problem for Freeport. A. A. Gustafson. *Mining Engineering,* v. 187, Oct. 1950, p. 1026-1026A.

Crusher developed by Freeport Sulphur Co. for crushing large blocks of sulfur to conveyor size. Application to potash, coal, salt, clay, shale, and some iron ores is believed possible. (B13)

291-B. Preliminary Report of Massco Circuitron. Allen E. Craig, William J. Tait, and E. P. McCurdy. *Mining Engineering,* v. 187, Oct. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, 1950, p. 1038-1040.

Grinding-circuit control equipment applies current from the classifier-motor circuit and energy from the sound of grinding media to move an oscillating disk. The disk controls the speed of the ore feeder and consequently the amount of ore delivered to the mill by means of a photo-electric cell. It is now in use at Telluride Mines, Inc., Telluride, Colo., on variable ores containing Pb, Zn, Cu, and some Au and Ag. Nominal capacity is 500 tons per day. (B13)

292-B. Conductance Electrostatic Separation With Convective Charging. Foster Fraas and Oliver C. Ralston. *Mining Engineering,* v. 187, Oct. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, 1950, p. 1041-1043.

Separator in which a dielectric electrode and the particles on a carrier roll are simultaneously charged by corona. Characteristics and procedure for operating the separator on step-crushed ores. Theory of operation and results obtained on a quartz-hematite (specular) ore from Lyon Mt., New York. (B13, Fe)

293-B. Pilot-Plant Investigation of Concentration of Blackbird Cobalt Ore by Roast-Flotation Process. S. R. Zimmerley and S. F. Ravitz. *Mining Engineering,* v. 187, Oct. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, 1950, p. 1044-1046.

High-grade concentrates were produced from ore with very good recovery in continuous pilot-plant operations in which a low-grade bulk cobaltite-pyrite flotation concentrate was roasted in a multiple-hearth furnace to oxidize the pyrite selectively. The cobaltite was floated from the resulting calcine. (B14, Co)

294-B. Ore Treatment at Great Boulder. J. W. Green. *Mine & Quarry Engineering,* v. 16, Oct. 1950, p. 314-318.

Details of equipment and procedures of above Australian gold mine and mill. Ore-treatment flowsheet. (B13, B14, Au)

295-B. Quemont—Designed Today for Tomorrow's Production. R. J. Dionne. *Engineering and Mining Journal,* v. 151, Oct. 1950, p. 74-79.

Mine and mill of Quemont Mining Corp., Noranda, Quebec. Zn, Cu, Ag, and Au are recovered. Flow diagram and equipment. Plans have been prepared extensively enough to take care of any likely future expansion. (B general, Zn, Cu, Ag, Au)

296-B. New Plant Treats Low Grade Iron Ore at Wacootah Mine. David N. Skillings. *Skillings' Mining Review,* v. 39, Oct. 14, 1950, p. 1, 4.

Outdoor screening, crushing, and washing plant. Includes schematic diagram of layout. (B13, Fe)

297-B. Comminution Plant. F. Lebeter. *Mine & Quarry Engineering,* v. 16, Sept. 1950, p. 273-276; Oct. 1950, p. 327-330.

First installment: General observations; cone crushers. Oct. issue: Various types of equipment for size

reduction of ores and minerals. Gyratory crushers, jaw crushers, and ball mills. (To be continued.) (B13)

298-B. Some Notes on a Mechanical Concentrator. T. Haden. *Bulletin of the Institution of Mining and Metallurgy,* Nov. 1949, p. 17-24; discussion, Jan. 1950, p. 25-29; Aug. 1950, p. 27.

New type used in concentration of gold. The concentrating surface is a riffled rubber blanket on an endless belt which moves upward at an angle while a slow stream of water flows over it. (B14, Au)

299-B. Gold Concentration at the Amalgamated Banket Areas Reduction Plant. G. Chad Norris. *Bulletin of the Institution of Mining and Metallurgy,* Nov. 1949, p. 1-16; discussion, Jan. 1950, p. 25-29; May 1950, p. 41-42.

Previously abstracted from *Journal of the Chemical Metallurgical & Mining Society of South Africa.* See item 150-B, 1950. (B14, Au)

300-B. Factors Affecting the Rate of Formation of Zinc Ferrite From Zinc Oxide and Ferric Oxide. *Bulletin of the Institution of Mining and Metallurgy,* Jan. 1950, p. 17-23; Apr. 1950, p. 51-52.

Jan. issue: General discussion of above paper by D. W. Hopkins (Oct. 1949 issue; see item 1C-77, 1949). Apr. issue: Author's reply. Information is applicable to the roasting of Zn concentrates and subsequent reduction and distillation. (B15, C22, Zn)

301-B. An Investigation Into the Action of Air in Froth Flotation. Jan Dzienisiewicz and E. J. Pryor. *Bulletin of the Institution of Mining and Metallurgy,* Apr. 1950, p. 1-22; discussion, Aug. 1950, p. 29-31.

The standard "captive bubble" method of measuring surface changes of minerals by contact angle. Variations of the method include use of self-anchored, rolling, and rising bubbles. Some of the aerating conditions in ordinary flotation work were examined under laboratory control. (B14)

302-B. Melting Point and Structure of Ferrous Oxide and Ferrous Oxide-Lime Silicate Melts in the Presence of Zinc Sulfide. (In German.) Paul Klare. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 3, Aug. 1950, p. 254-257.

Experiments show that silicate slags have a limited ability to dissolve sulfides. Each of the above slags has a minimum melting point when it contains 15% ZnS. They differ, however, in eutectic freezing points, viscosity, and solubility of sulfide in the solid state. (B21, Fe, Zn)

303-B. Development of Modern Mechanical Flotation Machines. (In German.) Gotthold Quittkat. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 3, Aug. 1950, p. 257-264.

Emphasizes special characteristics of the individual machines from the standpoint of the ore dresser as well as the designer. Includes schematic diagrams. (B14)

304-B. Pelletizing of Dogger Ore Concentrate and Fine Spar. (In German.) Georg Sengfelder. *Stahl und Eisen,* v. 70, Aug. 31, 1950, p. 765-767.

Equipment and procedures for converting above iron ore (41% Fe, 8-9% Al_2O, 12-14% ignition loss) into pellets by use of oxidizing flame burners. Hydrogen reduction of the pellets was also studied. (B16, Fe)

305-B. Electromotive Forces in a Liquid-Metal—Slag System. (In Russian.) O. A. Esin and L. K. Gavrilov. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, July 1950, p. 1040-1048.

Electromotive forces were investigated at 1600° C. in a system consisting of Fe-C alloys containing 0.2-4.7% C, of slag containing CaO and Al_2O_3, and of carbides of Ca and Al. Validity of the electrochemical theory of the processes of interaction of liquid cast iron or steel with slags is confirmed and free-energy values are evaluated. Experimental data and apparatus. 11 ref. (B21, P12, Fe)

306-B. (Book) **Modern Refractory Practice.** Ed. 3. 439 pages. 1950 Harbison-Walker · Refractories Co., Pittsburgh, Pa.

Service conditions and requirements of refractories in a variety of furnaces. Furnace design and construction, including scale drawings. Properties of refractories. (B19)

307-B. (Book) **Unit Operations.** George Granger Brown. 611 pages. 1950. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. $7.50.

A text devoted to practice, equipment, and mathematical interpretations. Includes sections on screening, size reduction of solids, classification of fluids, flotation, and sedimentation. Each chapter includes problems and a bibliography. (B13, B14)

308-B. (Book) **The Practice of Mineral Dressing.** F. B. Michell. 391 pages. 1950. Mine & Quarry Engineering, Electrical Press, London, England.

Plant practice and current flowsheets, based on a series of articles which have appeared in *Mine and*

Quarry Engineering. Covers Cu, Au, Fe, Pb, Zn, Ag, Sn, W, and lesser metallic minerals. Includes chapter on nonmetallic minerals. Chapter bibliographies.
(B13, B14, Ag, Au, Cu, Fe, Pb, Sn, W, Zn)

309-B. (Book) **The Extraction of Non-Ferrous Metals.** E. R. Roberts. 180 pages. Temple Press Ltd., Bowling Green Lane, London, E. C. 1, England. 16s net.

The general principles underlying metallurgical extraction. Primarily intended for the student of chemistry or chemical engineering. Theoretical considerations, the occurrence, dressing, and pretreatment of ores, and methods of extraction. Chapters deal with each of the common nonferrous metals, the noble metals, and the "rarer" metals.
(B general, EG-a)

310-B. (Book) **Erzlagerstatten. Kurzvorlesungen zur Einfuhrung und zur Wiederholung.** (Ore Deposits. Short Introductory and Review Lectures.) Ed. 2. Hans Schneiderhohn. 326 pages. 1949. Piscator-Verlag, Stuttgart, Germany. 14 DM.

A condensed version of Vol. I of the author's "Lehrbuch der Erzlagerstattenkunde" published in 1941; no illustrations. A feature is a detailed classification of ore deposits based on their origin. Those of plutonic, sedimentary, and metamorphic origin are subdivided into groups; the groups are subdivided according to their composition, and these again into various types. A subject index and index of localities are provided. Folding tables give an almost complete list of metals, chemical formulas of minerals in which they occur, metallic contents, and specific gravities. (B10)

311-B. Improved Refractory Now Produced in Volume. *Iron Age,* v. 166, Oct. 26, 1950, p. 60.

Properties of "Allmul", a practically all-mullite refractory, now being produced by Babcock & Wilcox Co. It is principally used in the manufacture of firebrick, but will also be available in the form of grain and as a ramming mix. (B19)

312-B. The Fluosolids Reactor: Cochenour Willians Gold Mine, Ltd. Owen Matthews and Sidney Wright. *Canadian Mining Journal,* v. 71, Oct. 1950, p. 72-74.

Equipment by which an arsenopyrite gold-bearing concentrate is prepared for cyanidation. The reactor has demonstrated its ability to convert a concentrate containing arsenopyrite, pyrite, stibnite, and gangue from which gold could not be extracted economically, into one from which it can be recovered economically by means of standard cyanidation methods and equipment.
(B14, Au)

313-B. Industrial Refractories. J. Lomas. *Machinery Lloyd* (Overseas Edition), v. 22, Sept. 30, 1950, p. 85-87, 89, 91.

Types and applications. (B19)

314-B. Fuel Oil in the Steel Industry in the U. S. A. A. J. Fisher. *Institute of Fuel and Institute of Petroleum,* "Modern Applications of Liquid Fuels", 1950, p. 64-95; discussion, p. 95-115.

Data on fuel reserves, production, and consumption. Use of fuel oil in coke ovens, blast furnaces, open-hearth furnaces, boilers, soaking pits, forge furnaces, heat-treating furnaces, etc.
(B10, D general, F21, J general, ST)

315-B. The Use of Fuel Oil in Furnaces for the Iron and Steel Fabricating Industries. M. Roddan. *Institute of Fuel and Institute of Petroleum,* "Modern Applications of Liquid Fuels", 1950, p. 116-149.

Efficiency of combustion and heat application. Various types of burners and furnaces used with fuel oils. (B18, ST)

316-B. Central Eureka Cuts Gold Loss by Feeding Reagent at New Location. *Mining World,* v. 12, Nov. 1950, p. 13.

Simple change which resulted in 25% reduction in gold loss. Using one of the flotation reagents to act as a dispersing agent in the jig circuit, in addition to its flotation role, has made the improvement possible.
(B14, Au)

317-B. Iron Ore Flotation at Canisteo. *Mining World,* v. 12, Nov. 1950, p. 28-32.

Pilot-plant work of Minerals Separation North American Corp., which proves that starch, lime, and soap are satisfactory reagents for low-cost flotation of iron minerals. Results for the 1948 and 1949 operating seasons. Cost estimates and an economic analysis. (B14, Fe)

318-B. Processing Uranium Ores. F. W. McQuiston, Jr. *Mining Congress Journal,* v. 36, Oct. 1950, p. 28-30.

Hydrometallurgical methods used to treat domestic materials. (B13, U)

319-B. Investigation of New Special Deoxidizers. C. G. Mickelson. *Journal of Metals,* v. 188, Nov. 1950, p. 1311-1311C.

Experimental work on use of a series of deoxidizers for cast steel including: Al; Na; Al+Se; Al+Graphidox (6% Ca, 50% Si, 10% Ti); Al+Ca-Mn-Si alloy; and a Si-Mg-Al alloy. (B22, CI)

320-B. Slag Materials and Action in Basic Arc Furnaces. C. B. Post and D. G. Schoffstall. *Journal of Metals,* v. 188, Nov. 1950, p. 1313-1315.

Properties and choice of materials. (B21, D5, ST)

321-B. Modernizing New Jersey Zinc's Eagle Mill. Part I. J. G. Craig. *Engineering and Mining Journal,* v. 151, Oct. 1950, p. 80-85; Nov. 1950, p. 101-105.

Improvement program includes rod-mill crushing, soluble-salt removal, new equipment installation, revised flowsheet, and automatic controls. Lead and zinc are recovered in above mill, which is largely underground, near Gilman, Colo. Flowsheet. (B13, B14, Pb, Zn)

322-B. Engineering Features in Northern Rhodesian Base Metal Mining. *Mining Journal,* v. 235, Oct. 27, 1950, p. 391-394.

Equipment and procedures for size reduction, beneficiation, smelting, and refining of Cu, Zn, and Pb. (B13, B14, C21, Cu, Zn, Pb)

323-B. Refractories—Their Manufacture and Use. A. H. Thomson. *Canadian Metals,* v. 13, Oct. 1950, p. 14-16, 43.

Raw materials used, manufacturing processes, and basic and specialized uses. (B19)

324-B. Production of Aluminium From Indian Bauxite. Sumeru Chandra Jain and P. D. Pant. *Transactions of the Indian Institute of Metals,* v. 1, Apr. 1949, p. 87-131; discussion. p. 131-133.

Raw material, process, and equipment. Numerous flow diagrams. (B10, C23, Al)

325-B. A Note on the Extraction of Copper at the Moubhandar Works of the Indian Copper Corporation Ltd. J. G. Berry. *Transactions of the Indian Institute of Metals,* v. 3, 1949, p. 333-345.

Equipment and procedures for ore beneficiation and smelting. (B14, C21, Cu)

326-B. The Production of Rammed Masses of Dolomite With High Packing Density. (In German.) Gerhard Tromel. *Stahl und Eisen,* v. 70, Sept. 28, 1950, p. 883-887.

Recommendations for increasing the life of dolomite linings for open-hearth and electric furnaces by proper grain-size selection. Reactions between the lining and the metal-slag bath were observed and it was found that the rapidly oxidizing steel retained in the lining plays an important part in the life of the hearth as well as in the refining of the next melt. Use of dolomite for repairing furnaces, lining converters, and producing dolomite bricks. 27 ref. (B19, D2, D5)

327-B. Removal of Arsenic From Lead Concentrates by Roasting the Powder With Pyrite. (In German.) Franz Brenthel. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 3, Sept. 1950, p. 290-296.

Experiments with different types of concentrate. Those containing up to 2% As require at least 10% pyrite to vaporize the As in the range 450-700° C. Use of an inert-gas atmosphere is recommended. (B15, Pb)

328-B. Crushing Practice and Theory. Part II. Definitions Used in Crusher Operation. Part III. Operating Characteristics of Various Types of Crushers. Part IV. Gyratory Crusher Concaves. Brownell McGrew. *Rock Products,* v. 52, Sept. 1950, p. 95; Oct. 1950, p. 116-117, 131; Nov. 1950, p. 62-63. (To be continued.) (B13)

329-B. Sintering of Powdered Magnetite. (In Italian.) Giovanni Gianasso. *Metallurgia Italiana,* v. 42, July 1950, p. 268-272.

Results of laboratory tests show that in sintering of magnetite ores, it is possible to obtain a solid, but porous and very reactive product, by heating at 900-1100° C. in an oxidizing atmosphere. This makes it possible to modify sintering conditions of the Gröndal process obtaining, at the same time, a reduction of cost and improvement of the product. Pilot-plant results starting from very fine and highly enriched powdered ores show that it is possible to obtain superior results. (B16, Fe)

330-B. Apparatus for Beneficiation of Ores by a "Flotation-Granulation" Process. (In Russian.) I. N. Plaksin and I. I. Kurenkov. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Aug. 1950, p. 1189-1197.

Method and apparatus for beneficiation of varied ores based on a combination of gravitation and flotation. Admission of atomized air together with a jet of water and installation of air barriers are recommended for intensification of the process on the concentration table. Other modifications for improving the process. (B14)

331-B. (Book) Canadian Mines Handbook 1950. Part I. Principal Companies. Part II. Supplementary List, In-

cluding Inactive and Extinct Companies. 350 pages. 1950. Northern Miner Press Ltd., Toronto, Ont., Canada.

(B12, A10)

332-B. (Book) **Raw Materials of the Iron and Steel Industry.** A. K. Osborne. *Purchasing Officers' Association* (Wardrobe Chambers, 146 Queen Victoria St., London E.C. 4, England), 1950, 31 pages. 3s.

Approach is from an economic aspect. Sources, availability and consumption of various materials, together with a brief outline of their uses and the methods by which they are produced. Coal and refractories are not included. (B10, A4)

333-B. Semisilica Refractories Lessen Furnace Structural Failures. G. Bickley Remmey. *Steel,* v. 127, Nov. 27, 1950, p. 62-64, 66, 68.

Semisilica brick, having high resistance to structural and thermal spalling and low resistance to plastic flow, are making excellent service records in kilns, soaking pits, forging furnaces, heating furnaces of all types, hot-metal mixers, open-hearth-furnace checker linings and fantails, and blast-furnace stoves. (B19)

334-B. The Treatment of Gold Ores in South Africa and Canada. E. C. Ellwood. *Bulletin of the Institution of Mining and Metallurgy,* Nov. 1950; *Transactions,* v. 60, pt. 2, 1950-51, p. 21-36.

Present practice with particular reference to the Witwatersrand. Some of the more controversial practices—such as hand sorting, milling in water rather than in barren cyanide solution, and use of pebble mills. On the Witwatersrand hand sorting is an economical practice, using native labor, but where labor costs are high this would not be the case. Use of pebbles for grinding might be considered in the Canadian gold fields. The relationship between comminution in the grinding and milling circuits with reference to the tendency on the one hand to use very fine crushing and, on the other, to use rod-mills for coarse grinding in the mill circuit. (B13, Au)

335-B. An Investigation Into the Action of Air in Froth Flotation. Jan Dzienisiewicz and E. J. Pryor. *Bulletin of the Institution of Mining and Metallurgy,* Nov. 1950; *Transactions,* v. 60, pt. 2, 1950-51, p. 47-52.

Authors' reply to discussion of a paper published in Apr. issue. See item 301-B, 1950. (B14)

336-B. Development of the Sludge-Sedimendation Process and Its Significance in the Dressing of Iron Ore. (In German.) Ernst Bierbrauer. *Archiv für das Eisenhüttenwesen,* v. 21, Sept.-Oct. 1950, p. 273-282.

Theoretical principles and industrial development of the process. Shows that it is a simple and efficient large-scale method for separating coarse-grained ores (up to 150 mm.) into concentrates, middlings, and tailings. Includes flowsheet, tables, and graphs. (B14, Fe)

337-B. Flotation and Cyanidation Tests on a Gold-Copper Sulfide Ore From Cooke, Montana. A. L. Engel and H. J. Heinen. *Mines Magazine,* v. 40, Sept. 1950, p. 28, 40; Nov. 1950, p. 24-26.

Previously abstracted from *U. S. Bureau of Mines,* Report of Investigations 4670. See item 175-B, 1950. (B14, Ag, Au, Cu)

338-B. Discussion—Extractive Metallurgy Division. *Journal of Metals,* v. 188, Nov. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1382-1388.

Covers the following papers: "The Electrical Resistivity of Titanium Slags", J. L. Wyatt (Aug. 1950); "The Relationship Between Electrical Conductivity and Composition of Molten Lead Silicate Slags", A. K. Schellinger and R. P. Olsen (Dec. 1949); "Thermodynamic Relationships in Chlorine Metallurgy", H. H. Kellogg (June 1950); "Fundamental and Practical Factors in Ammonia Leaching of Nickel and Cobalt Ores", M. H. Caron (Jan. 1950); and "Separation of Nickel and Cobalt", M. H. Caron (Jan. 1950).

(B general, C general, EG-a)

339-B. Studies of Recovery Processes for Western Uranium Bearing Ores. VI. Precipitation of Vanadium Red Cake. F. G. Seeley and C. F. Coleman. *U. S. Atomic Energy Commission,* AECD-2867, Oct. 20, 1949, 20 pages.

Results of an empirical study of precipitation from carbonate solutions. Best precipitation was obtained at pH 2.0-2.5. The rate was increased by increase of initial V, NaCl, or SO_4 concentration. (B13, U)

340-B. Mining and Milling Methods at the Caselton Mine, Combined Metals Reduction Co., Pioche, Lincoln County, Nev. George H. Holmes, Jr. *U. S. Bureau of Mines,* Information Circular 7586, Nov. 1950, 24 pages.

Crushing plant, milling practices, filter plant, and assay office. Metals obtained are Pb and Zn. (B13, B14, Pb, Zn)

341-B. Notes on Ball and Rod Mill

Liner Practice in the Noranda Organization. *Canadian Mining and Metallurgical Bulletin,* v. 43, Nov. 1950, p. 621-634; discussion, p. 634-635; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 53, 1950, p. 435-448; discussion, p. 448-449.

Typical liner-performance data for various grinding mills at the Noranda, Waite-Amulet, Pamour, and Hallnor mines. A comparison of these data, based on wear per sq. ft. of lined millshell area. Compares wear performance of various alloy liner materials. (B13, Q9)

342-B. Progress in Iron Ore Beneficiation. Grover J. Holt. *Canadian Mining and Metallurgical Bulletin,* v. 43, Nov. 1950, p. 636-638; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 53, 1950, p. 450-452. (B 14, Fe)

343-B. The Relation Between Refractory Life and Refractoriness. W. J. Rees. *Iron and Steel Research Association,* "Conference on Cupola and Converter Refractories", 1949, p. 5; discussion, p. 13-14.

Defines refractoriness. Various factors which affect refractory life; test methods. (B19)

344-B. Preliminary Results of Ore Beneficiation of Ore From the Damme Mine. (In German.) Georg Sengfelder. *Stahl und Eisen,* v. 70, Oct. 26, 1950, p. 957-958.

Procedure developed for the above iron ore (22-23% Fe), clarified by flow diagrams. Compositions of raw ore and concentrates are tabulated. (B14, Fe)

345-B. Centrifugal Separation of Alloys. (In German.) Walter Roth. *Zeitschrift Für Erzbergbau und Metallhüttenwesen,* v. 3, Oct. 1950, p. 328-334.

Both theoretical and experimental investigations promise little practical success for segregation of alloy components by centrifuging the molten metal. However, the separation of primary crystals from the remainder of the melt by this method is more promising. It was found that shape and size of the crystals as well as viscosity of the melt affect the separation process. (B14)

346-B. New Process May Make Low-Grade Tin Ore Profitable. Colin G. Fink and Howard J. Strauss. *Engineering and Mining Journal,* v. 151, Dec. 1950, p. 96-97.

Experiments in partial reduction (SnO_2 to SnO) in a controlled atmosphere before leaching which indicate possibility of profitable use of low-grade tin ores and concentrates. A CO-CO_2 system was used. Partial reduction is preferred for several reasons. (B14, Sn)

347-B. Calculate Classifier Data Accurately by New Method. Fred C. Bond. *Engineering and Mining Journal,* v. 151, Dec. 1950, p. 90-91.

Circulating loads and efficiencies are best determined by actual measurement. However, next best is the method based on particle sizes determined from size-distribution curves. Illustrated by a typical example calculated both ways. (B13)

348-B. Twenty-One Years Progress in Refractories. J. H. Chesters. *Metallurgia,* v. 42, Nov. 1950, p. 293-296.

A review. (B19)

349-B. Ionic Theory of Slag-Metal Equilibria: Part I. Derivation of the Fundamental Relationships. P. Herasymenko and G. E. Speight. *Journal of the Iron and Steel Institute,* v. 166, Nov. 1950, p. 169-183.

Equilibrium positions of the principal ferrous slag-metal reactions are derived from the laboratory investigations of Chipman, Quarrell, Oelsen, and coworkers, assuming an ionic structure for slags. Advantage of this theory is shown to be that the number of slag constituents sufficient to describe the physicochemical behaviour of basic slags is considerably smaller than in theories assuming the presence of oxide molecules and their compounds. 32 ref. (B21, D general, Fe)

350-B. Flotation. Strathmore R. B. Cooke. "Advances in Colloid Science, Vol. III", Interscience Publishers, New York, 1950, p. 321-374.

Colloid production in grinding and flotation reagents, including frothers, collectors, activators, and depressants. 78 ref. (B14)

SECTION C

NONFERROUS EXTRACTION and REFINING

1C. Melting and Casting of Non-Ferrous Metals. *Industrial Heating,* v. 16, Dec. 1949, p. 2164, 2166, 2168. Condensed from paper by G. L. Bailey and W. A. Baker.

Previously abstracted from *Journal of the Institute of Metals.* See item 14C-13, 1949. (C5, E25)

2C. Zinc Metallurgy in 1949. H. R. Hanley. *Journal of Metals* (Technical Section), v. 188, Jan. 1950, p. 16G-16H.

New technical developments in desulfurization, retorts, distilling furnaces, continuous distilling, electrolytic treatment, and zinc fuming. (C general, Zn)

3C. Separation of Nickel and Cobalt. M. H. Caron. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Jan. 1950, p. 91-103.

Several chemical methods for separating Ni and Co obtained by ammonia leaching. Also an electrolytic method for separating alloys of the two metals. (C28, Ni, Co)

4C. Reflections on the Electrolytic Cells Used in the Production of Aluminum. Bruno B. A. Luzzatto. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Jan. 1950, p. 105-121; discussion, p. 121.

Analysis of the electrochemical and thermal aspects of the process. The necessity of striving for a reduction of heat losses, especially those through the upper surface. This can be achieved by use of improved self-baking electrodes as a substitute not only for multiple prebaked electrodes, but also for conventional self-baking electrodes now in use. (C23, Al)

5C. Fuming Tin Slags. C. W. Jensen *Mining Magazine,* v. 81, Dec. 1949, p. 337-339.

German technique developed to fume slags without briquetting in a short blast furnace, which results in higher recovery and lower costs. All types of slags can be treated successfully as well as low-grade Bolivian cassiterite concentrates. (C21, Sn)

6C. Preparation of Hyper-Pure Silicon. D. W. Lyon, C. M. Olson, and E. D. Lewis. *Journal of the Electrochemical Society,* v. 96, Dec. 1949, p. 359-363.

Reduction of SiCl with Zn vapor. This reaction, which takes place at 950° C., was carried out in fused-silica apparatus. The product was essentially spectrographically free of metallic impurities and had extremely low electrical conductivity. (C22, Si)

7C. A Two Liquid Phase Distribution Method for the Separation of Metallic Elements. M. Calvin. *U. S. Atomic Energy Commission,* AECD-2710; UCRL-407, Aug. 1, 1949, 3 pages.

General principles of a liquid-liquid solvent-extraction method. (C28)

8C. Segregation and Liquation in Alloys. Albert Portevin and Marc Dannenmuller. *Engineering,* v. 168, Dec. 23, 1949, p. 683-685. A condensation.

Previously abstracted from *Journal of the Institute of Metals.* See item 2C-82, 1949. (C28, N12, Pb)

9-C. Continuous Casting of Brass Slabs. Harold J. Roast. *Metal Progress,* v. 57, Jan. 1950, p. 51-55.

Equipment and procedure at new mill of Scovill Mfg. Co. for production of coiled brass strip in extra long lengths. Includes detailed diagrams of the melting and casting equipment. (C5, Cu)

10-C, Pig Iron and Pigment. *Chemical Industries,* v. 66, Jan. 1950, p. 24.

Ilmenite will be converted to pig

iron and high-Ti slag in new electric smelter at Sorel, Quebec. The latter will be used for production of Ti concentrates for pigment or metal production. (C21, Fe, Ti)

11-C. Mercury in Chemical Metallurgy. H. Hohn. *Research,* v. 3, Jan. 1950, p. 16-23.

The term "amalgam metallurgy" describes certain new processes developed in Germany. Several pilot plants have been in operation; and a full-scale plant for production of pure zinc from roasted pyrites was built. Amalgam metallurgy enables low-grade complex ores to be used. Applicability to a wide range of metals. 41 ref. (C29)

12-C. Lead Smelting in the Ore Hearth. III. Zonal Action in the Smelting Column. G. L. Oldright. *U. S. Bureau of Mines,* Report of Investigations 4591, Jan. 1950, 43 pages.

Correlates composition of gases prevailing in the charge column at various elevations with the nature of the charge column, tracing the steps by which PbS is converted into metallic lead. (C21, Pb)

13-C. The Removal of Magnesium From Aluminum Alloys. (In German.) Kurt Schneider and Eugen Berblinger. *Zeitschrift für Metallkunde,* v. 40, Nov. 1949, p. 411-417.

Comparison of different methods shows that treatment with chlorine is the most economical method. Experimental data and refining costs. (C4, Al)

14-C. 1949 Was a Year of Progress in Non-Ferrous Metallurgy. A. W. Schlechten. *Engineering and Mining Journal,* v. 151, Feb. 1950, p. 120-124.

Reviews 1949 developments. Emphasis on Ti, Zr, Cu, Ni, Pb, and Zn. (C general, EG-a)

15-C. Developments in the Application of Activated Carbon to Cyanidation, Including the Desorption of Gold and Silver From Carbons. E. H. Crabtree, Jr., V. W. Winters, and T. G. Chapman. *Mining Engineering; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, Feb. 1950, p. 217-222.

Experimental and pilot-plant work completed since 1939, including various methods developed in applying coarse activated carbon to cyanidation. Methods and results developed for desorbing gold and silver from carbons, and possibilities for re-use of the desorbed carbons. (C24, Au, Ag)

16-C. Continuous Countercurrent Decantation Calculations. T. B. Counselman. *Mining Engineering; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, Feb. 1950, p. 223-225.

Shortcut method for making above calculations used in cyanidation and by chemical engineers. The method is said to be particularly valuable in selecting the best of several possible flowsheets, and in evaluating the effects of various assumptions. (C24, Au, Ag)

17-C. Preparation and Properties of Titanium-Base Alloys. P. H. Brace, W. J. Hurford, and T. H. Gray. *Industrial and Engineering Chemistry,* v. 42, Feb. 1950, p. 227-236.

With particular reference to behavior in cast form at high temperatures. The alloys were prepared by melting and casting in vacuum under an argon atmosphere. Experiences with various refractories. Design and manufacture of molds for producing cast specimens for tensile test. Quantitative tensile data at several elevated temperatures and some information concerning oxidation characteristics. (C25, Q27, Ti)

18-C. Titanium Tetra-Iodide; Preparation and Refining. Warren B. Blumenthal and Howard Smith. *Industrial and Engineering Chemistry,* v. 42, Feb. 1950, p. 249-251.

History of TiI_4 and a new method for its preparation. The compound is of especial interest in Ti metallurgy because it may be decomposed thermally to yield Ti metal. The procedure also has value for qualitative and quantitative determination of metallic Ti. 19 ref. (C4, Ti)

19-C. Production of Malleable Zirconium. W. J. Kroll and W. W. Stephens. *Industrial and Engineering Chemistry,* v. 42, Feb. 1950, p. 395-398.

A pilot plant for production of 300 lb. of Zr sponge per week in operation at the U. S. Bureau of Mines station in Albany, Ore. Steps are as follows: arc-furnace smelting of ore or concentrate with carbon to produce impure carbide; chlorination to $ZrCl_4$; purification and densification by sublimation; reduction by Mg and purification of the resulting sponge by fusion and vacuum distillation; and vacuum melting to produce ingots. (C21, C25, Zr)

20-C. Scovill Brass Plant Features Continuous Processes. *Iron and Steel Engineer,* v. 27, Jan. 1950, p. 90-92.

Continuous casting of brass. (C5, Cu)

21-C. Continuous Casting Machine Increases Mill Production. *Machine Design,* v. 22, Feb. 1950, p. 143-145.

New brass strip mill of Scovill Manufacturing Co. (C5, Cu)

22-C. Results of Research on Metal-Slag Reactions. (Concluded.) Willy Oelsen. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 2, Dec. 1949, p. 368-371.

The metallurgy of Cb and Ta. Surveys the literature on the equilibria between metal melts and sulfide slags. Reducing effects of Mn, soda, and sodium metasilicate. (C21, Cb, Ta)

23-C. Mechanism and Kinetics of Oxidation of Lead Sulfide by Oxygen. (In Russian.) D. M. Chizhikov, G. S. Frents, and B. Ya. Tratsevitskaya. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR) (Section of Technical Sciences), Sept. 1949, p. 1352-1360.

Character and sequence of basic chemical reactions occurring during the process. Method of the investigation and data. (C21, Pb)

24-C. The Reaction Between Magnesia and Carbon Monoxide. (In Russian.) D. M. Chizhikov, E. I. Khazanov, and A. G. Nikonov. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Oct. 1949, p. 1493-1500.

The "carbothermic" reduction of metals with carbon or CO, and the types of metals to which it is applicable. Reduction of MgO by means of Al, CaC_2, C, Si, and SiC, giving required temperatures and pressures. Reduction using CO. (C21, Mg)

25-C. Harvey Machine Plans $50 Million Aluminum Facility in Nevada. James Joseph. *Western Metals,* v. 8, Feb. 1950, p. 21-23.

Plans include manufacture of carbon electrodes for the reduction process; electrochemical reduction of bauxite; and a rolling mill. (C23, F23, Al)

26-C. Concerning the Thermal Reduction of Magnesium Oxide With Calcium Carbide. (In German.) A. Schneider and G. Hutt. *Zeitschrift für anorganische Chemie,* v. 257, Dec. 1948, p. 289-315.

Experimental equipment used in determining the effect of temperature, grain size, and previous heat treatment. Heat of reaction and equilibrium constants. 35 ref. (C26, Mg)

27-C. Concerning the Production of Metallic Magnesium From Magnesium Oxide by Reduction With Calcium Carbide. (In German.) H. Heinrich Franck and Rudolf Wallongh. *Zeitschrift für anorganische Chemie,* v. 257, Dec. 1948, p. 316-339.

Experimental reduction of MgO with CaC_2 in vacuum and in an inert atmosphere. In vacuum, MgO is reduced above the boiling point of Mg by a simple diffusion process. In an inert atmosphere, maximum reduction is 70%. Heat of reaction was determined. 14 ref. (C26, Mg)

28-C. Removing Hydrogen From Aluminum Melts. (In German.) H. Kalpers. *Archiv für Metallkunde,* v. 3, Dec. 1949, p. 427-428.

Because of the probability that H_2 not only dissolves in Al, but also combines with it, it is shown that additions which merely flush gaseous H_2 from the melt are unsatisfactory. Recommends use of chlorine gas or an undefined material known as "Flussum-Al" to remove chemically combined H_2. (C21, Al)

29-C. Continuous Casting of Light Metals by the Water-Cooling Process. (In German.) Walter Roth. *Zeitschrift für Metallkunde,* v. 40, Dec. 1949, p. 445-460.

Advantages of various continuous casting methods. Data prove the superior strength properties of Al-rich Al-Cu-Mg alloys cast by this method. (C5, Al)

30-C. Casting Equipment for Multiple Casting of Bars and Rods. (In German.) W. Helling and F. Gassner. *Metall,* v. 3, Nov. 1949, p. 367-373; Dec. 1949, p. 418-421.

A continuous casting process which permits close control over metal flow and prevention of oxidation and oxide inclusions. Part 2: Optimum casting rates for pure Al and two of its alloys. Surface micro and macrostructures. (C5, Al)

31-C. Improving the Refining of Copper in the Mansfeld Copper Plant. (In German.) *Metall,* v. 3, Dec. 1949, p. 426.

Involves injection of steam into the copper melt. Advantages of proposed method. (C21, Cu)

32-C. Metallurgical Principles of Tin Smelting. (In German.) G. Mertens. *Metall,* v. 4, Jan. 1950, p. 14-18.

Comprehensive general description of methods of extracting tin from its ores and refining it. Dry and electrolytic refining as well as the "poling" of tin (use of green wood in the bath). (C21, C23, Sn)

33-C. Reduction Potential of Alumina and Mechanism of Its Electrolysis in Industrial Furnaces. II. (In Italian.) A. Vajna. *Alluminio,* v. 18, Nov.-Dec. 1949, p. 599-602.

Summarizes discussion at meeting of the French Electrical Society. Critical analysis of proposed theories

indicates that no reliable conclusions can be reached on the basis of existing information. (C23, Al)

34-C. Metal Smelting and Melting Furnaces. (In Dutch.) H. Leusink. *Metalen,* v. 4, Jan. 1950, p. 81-88.

Various types of furnaces used for smelting and melting of nonferrous metals. (C21)

35-C. Production of Magnesium at Painesville, Ohio. J. M. Avery and R. F. Evans. *Transactions of the American Institute of Mining and Metallurgical Engineers,* (Extractive Metallurgy Division), v. 182, 1949, p. 51-58.

Previously abstracted from *Metals Technology.* See item 2-53, 1945. (C23, Mg)

36-C. Pilot-Plant Production of Electrolytic Magnesium From Magnesia. R. R. Lloyd, C. K. Stoddard, K. L. Mattingly; E. T. Ledigh, and R. G. Knickerbocker. *Transactions of the American Institute of Mining and Metallurgical Engineers,* (Extractive Metallurgy Division), v. 182, 1949, p. 68-92.

Previously abstracted from *Metals Technology.* See item 2-55, 1945. (C23, Mg)

37-C. The Mufulira Smelter, Northern Rhodesia. F. E. Buch. *Transactions of the American Institute of Mining and Metallurgical Engineers,* (Extractive Metallurgy Division), v. 182, 1949, p. 127-139.

Previously abstracted from *Metals Technology.* See item 2C-1, 1948. (C21, Cu)

38-C. Roan Antelope Smelter, Northern Rhodesia. R. J. Stevens. *Transactions of the American Institute of Mining and Metallurgical Engineers,* (Extractive Metallurgy Division), v. 182, 1949, p. 140-157.

Previously abstracted from *Metals Technology.* See item 2C-2, 1948. (C21, Cu)

39-C. Evidence of Formation of Copper Ferrite From Reaction Between Cuprous Oxide and Copper Reverberatory Slags. Pei-Yung Huang and C. R. Hayward. *Transactions of the American Institute of Mining and Metallurgical Engineers,* (Extractive Metallurgy Division), v. 182, 1949, p. 158-176.

Previously abstracted from *Metals Technology.* See item 2-28, 1947. (C21, Cu)

40-C. Vacuum Dezincing in Lead Refining. W. T. Isbell. *Transactions of the American Institute of Mining and Metallurgical Engineers,* (Extractive Metallurgy Division), v. 182, 1949, p. 186-189; discussion, p. 189-190.

Previously abstracted from *Metals Technology.* See item 2-82, 1947. (C25, Pb)

41-C. Soda Treatment of Blast-Furnace Drosses at El Paso Smelter. A. A. Collins. *Transactions of the American Institute of Mining and Metallurgical Engineers,* (Extractive Metallurgy Division), v. 182, 1949, p. 191-196; discussion, p. 196-197.

Previously abstracted from *Metals Technology.* See item 2-42, 1947. (C21, Pb, Cu)

42-C. Distillation of Zinc and Refining of Residual Metals From Copper-Base Alloys. F. F. Poland. *Transactions of the American Institute of Mining and Metallurgical Engineers,* (Extractive Metallurgy Division), v. 182, 1949, p. 198-212.

Previously abstracted from *Metals Technology.* See item 15-25, 1946. (C22, A8, Cu, Zn)

43-C. Effect of Length of Cycle on the Economics of Retort Zinc Smelting. B. M. O'Harra and F. G. McCutcheon. *Transactions of the American Institute of Mining and Metallurgical Engineers,* (Extractive Metallurgy Division), v. 182, 1949, p. 213-221; discussion, p. 221-225.

Previously abstracted from *Metals Technology.* See item 2-84, 1947. (C21, Zn)

44-C. Laboratory Preparation of Lithium Metal By Vacuum Metallurgy. W. J. Kroll and A. W. Schlechten. *Transactions of the American Institute of Mining and Metallurgical Engineers,* (Extractive Metallurgy Division), v. 182, 1949, p. 266-274.

Previously abstracted from *Metals Technology.* See item 2-137, 1947. (C25, Li)

45-C. Vacuum Process for Preparation of Lithium Metal From Spodumene. R. A. Stauffer. *Transactions of the American Institute of Mining and Metallurgical Engineers,* (Extractive Metallurgy Division), v. 182, 1949, p. 275-284; discussion, p. 284-285.

Previously abstracted from *Metals Technology.* See item 2-239, 1947. (C25, Li)

46-C. Combined Power-Industry Utilization of Waste Gases by the Enin Scheme as Applied to Reverberatory-Furnace Melting of Nonferrous Metals. (In Russian.) N. A. Semenenko. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Nov. 1949, p. 1607-1619.

System is said to result in considerable increase in power efficiency

and productivity, decrease in costs, and ability to use lower grade fuels. (C21, EG-a)

47-C. Electrolysis of Nickel Sulfate in a Cell Containing an Impermeable Diaphragm. (In Russian.) D. M. Chizhikov and B. Z. Ustinskii. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 22, Dec. 1949, p. 1306-1309.

Experiments on the production of cathodic Ni deposits. Effects of electrical and compositional factors. (C23, L25, Ni)

48-C. Conditioning Dwight-Lloyd Gases to Increase Bag Life. R. E. Shinkoskey. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Mar. 1950, p. 608-609.

Program for increasing the life of woolen bags used for filtering Dwight-Lloyd gases at Selby, Calif., plant of American Smelting and Refining Co., by treating the bags and gases with hydrated lime. Methods and apparatus for determining alkalinity of dusts, acidity and breaking strength of bag cloth. (C21, A8)

49-C. An Improved Automatic Smoke Sampler. J. J. Donoso. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Mar. 1950, p. 610-612.

Continuous and accurate determination of smoke losses in a smelter. Modern pneumatic differential controlling instruments that allow simultaneous sampling of multiple points using only one filter and one exhaust system. (C21, A8)

50-C. Description of the Refining of a Batch of 150 Tons of Crude Lead, Obtained From the Ore of Ribera de Iguape, Sao Paulo. (In Portuguese.) Tharcisio D. de Souza Santos and Clovis Bradaschia. *Boletim da Associaçao Brasileira de Metais,* v. 5, Oct. 1949, p. 477-492; discussion, p. 492-495.

Experimental equipment and procedure using a blast furnace designed for reduction of iron, and fired with wood. Detailed phase diagrams show desilvering and dezincification in a form not previously published. Simplicity, efficiency, and economy of the process; also a high-quality product. (C21, Pb)

51-C. Aluminothermic Reduction of "Noble" Metal Ores. (In Portuguese.) Eros Orosco. *Boletim da Associaçao Brasileira de Metais,* v. 5, Oct. 1949, p. 592-610.

A newly developed modification of the aluminothermic process for reduction of metals such as tungsten, titanium, and zirconium directly from the corresponding ores. Theoretical basis of the process. (C26, W, Ti, Zr, EG-d)

52-C. Multiple Continuous Casting. *Metal Industry,* v. 76, Mar. 3, 1950, p. 168. Translated and condensed from article by W. Helling and F. Gassner.

Previously abstracted from *Metall.* See item 30C-1950. (C5, Al)

53-C. Macro and Micro-Segregation in Ingots of Two Aluminium Alloys. P. Brenner and H. Kostron. *Metallurgia,* v. 41, Feb. 1950, p. 209-218.

Investigation made to obtain a general idea of micro-segregation in grains at different places in the ingot which show phenomena of inverse segregation. A Hanemann micro-hardness tester was used. Effects of solution heat treatment. (C5, M27, Al)

54-C. Tasks and Problems of Modern Electro-Chemistry. II. (In German.) Friedrich Müller. *Chimia,* v. 3, Dec. 15, 1949, p. 285-292; v. 4, Jan. 15, 1950, p. 1-5.

Reviews literature on electrometallurgy in aqueous solutions, nonmetallic aqueous electrolysis, molten electrolytes, electrothermic processes, and electrochemical gas reactions. 104 ref. (C23)

55-C. Continuous Method of Producing Ductile Titanium. P. J. Maddex and L. W. Eastwood. *Journal of Metals,* v. 188, Apr. 1950, p. 634-640.

Details of apparatus and procedure, including diagram of proposed pilot-plant unit. Magnesium reduces $TiCl_4$ to produce Ti or Ti-alloy ingots. (C26, Ti)

56-C. Large Melting and Annealing Furnaces Featured in Scovill's New Strip Mill. *Industrial Heating,* v. 17, Mar. 1950, p. 404-408, 410, 412, 414-415, 418, 420-422, 544, 546-548, 550, 552.

Flat-metal continuous casting process, which produces large rectangular-section brass bars and continuous strip mill, capable of producing the heaviest cold-rolled and non-welded brass coils in the industry. (C5, F23, J23, Cu)

57-C. Formation of Silicon Carbide During the Electrolysis of Cryolite-Alumina Melts. (In Russian.) P. F. Antipim and L. I. Ivanova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Jan. 11, 1950, p. 283-284.

When the melt contains silica as an impurity, it is thermally reduced to form silicon and alumina. SiC is then formed by reaction with Al_4C_3

and with carbon. Such formation interferes seriously with the normal reduction of alumina to aluminum, because of the accumulation of the carbide. (C23, Al)

58-C. (Book) **Symposium on Metallurgical Aspects of Non-Ferrous Metal Melting and Casting of Ingots for Working.** 168 pages. Institute of Metals, 4 Grosvenor Gardens, London, S.W.1, England. 15s. ($2.50.)

Of the six papers, one is concerned with basic principles, one gives a general view of brass practice, and four are straightforward accounts of particular processes. Cu-base alloys dealt with mainly. The various contributions have already appeared in the *Journal* and have been previously abstracted. (C21, C5, EG-a, Cu)

59-C. **Production of Titanium.** *Light Metal Age,* v. 8, Feb. 1950, p. 16-18, 30-31; Apr. 1950, p. 17-20. Condensed from "Production of Ductile Titanium at Boulder City, Nev.", F. S. Wartman, J. P. Walker, H. C. Fuller, M. A. Cook, and E. L. Anderson.

Previously abstracted from *U. S. Bureau of Mines,* Report of Investigations 4519, Aug. 1949. See item 2C-78, 1949. (C26, Ti)

60-C. **The Reduction of Ferrous Oxides in the Slags of Nonferrous Blast Furnaces.** (In German.) Ernst Justus Kohlmeyer and Karl Heinz Mahlich. *Zeitschrift fur Erzbergbau und Metallhuttenwesen,* v. 3, Feb. 1950, p. 34-40.

Three series of experiments show that the reduction of ferrous oxide in molten Fe-Ca silicates decreases with increasing percentage of silica. The presence of sulfur has the same effect; while As, combining with Fe to form iron arsenide, has the same effect as carbon. As_2O_3 did not affect the reduction process. Data cover oxides and sulfides of Fe, Cu, Pb, Zn, Sn, and Sb. Applicability to Pb and Cu blast-furnace practice is emphasized. (C21, Pb, Cu)

61-C. **A Study of Arc-Melted Molybdenum-Rich Chromium-Molybdenum Alloys.** H. D. Kessler and M. Hansen. *Transactions of American Society for Metals,* v. 42, 1950, p. 1008-1030; discussion, p. 1030-1032.

Previously abstracted from Preprint. See item 14C-77, 1949. (C21, M26, R2, Mo)

62-C. **Mercurial Metallurgy.** *Industrial and Engineering Chemistry,* v. 42, May 1950, p. 20A. Based on "Mercury in Chemical Metallurgy", H. Hohn.

Previously abstracted from *Research.* See item 11-C, 1950. (C29)

63-C. **The Nitrogen Chloride Refining of "NE", Especially Applicable to Light Metals.** (In German.) W. Dautzenberg. *Metall,* v. 4, Apr. 1950, p. 125-129.

A method of refining scrap aluminum and other light-metal alloys by removing their nonmetallic and gaseous impurities, Mg and Zn. Diagrams and a photograph illustrate the scrap converters. (C21, A8, Al, Mg)

64-C. **Melting and Casting of Nonferrous Metals.** *Metal Progress,* v. 57, May 1950, p. 650, 652, 654, 656, 658, 660, 662, 670, 672.

Condensed from "Symposium on Metallurgical Aspects of Nonferrous Metal Melting and Casting of Ingots for Working" (6 papers). First published in *Journal of the Institute of Metals,* v. 75, Jan. 1949 (papers separately abstracted); republished with discussion in *Institute of Metals,* Monograph and Report Series No. 6. See item 58-C, 1950. (C21, C5, EG-a, Cu)

65-C. **Lead-Removal and Slagging of Oker's Oxide Ores in the Revolving Furnace.** (In German.) Otto-Hermann Schutze. *Zeitschrift für Erzbergau und Metallhüttenwesen,* v. 3, Mar. 1950, p. 69-74.

Method used in the Herzog-Juliushütte for mining and smelting zinc oxide ores. Final products are a low-Pb concentrate and a Pb dust in utilizable form. (C21, Zn, Pb)

66-C. **Continuous Casting of Non-Ferrous Metals.** (In Polish.) M. Schneider and E. Zalesinski. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 2, no. 1, 1950, p. 49-70.

The Junghans, V. L. W., and Asarco process, their advantages and disadvantages. The possibilities of applying continuous casting methods to steel are considered with reference to the paper of H. Kästner *(Stahl und Eisen,* v. 66, 1947). Theoretical calculations of ingot solidifications are made according to formulas given by Roth. Effects of continuous casting on microstructure and on mechanical properties. 10 ref. (C5)

67-C. **Design and Control of Ferro-Alloy Furnaces.** F. V. Andreae. *Electrical Engineering,* v. 69, June 1950, p. 531. (A condensation; To be published in full in *AIEE Transactions,* v. 69, 1950.)

Ferro-alloy furnaces form a special group of electric furnaces in which the electrodes are buried in the charge instead of standing over a bath of molten metal as in steel-melting furnaces. They are used for the manufacture of various alloys such as ferrosilicon, ferrochrome, ferromanganese, silicomanganese, calcium silicide, and calcium carbide. Includes schematic diagram. (C21, Fe)

68-C. Energy Consumption in the Production of Ferrosilicon in the Triple-Phase Low-Stack Furnace. (In German.) Georg Volkert and Erich Schwarz. *Stahl und Eisen,* v. 70, Apr. 27, 1950, p. 369-371.

Results of a comparative study on the effect of different melting conditions. (C21, Fe-n, Si)

69-C. A Survey of the Thermodynamics of Copper Smelting. R. Schuhmann, Jr. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, June 1950, p. 873-884.

Available thermodynamic data are collected and tabulated, pointing out important gaps. An experimental research program is proposed to supply data that appear most essential to better quantitative understanding of the chemistry involved, and is designed specifically for practical problems of slag losses and magnetite behavior. 16 ref. (C21, P12, Cu)

70-C. Brass Bars for Strip and Sheet Continuously Cast in New Plant. *Inco,* v. 24, Spring, 1950, p. 4-8.

Production line at Scovill Manufacturing Co. starts with casting and ends with packaging of sheet and strip. (C5q, Cu)

71-C. Refining of Tin. E. H. Jones. *Mining Journal* (London), v. 234, May 19, 1950, p. 514-517.

Flotation, calcination, acid leaching, smelting, liquation, electrolysis, distillation, and specialized processes. (C general, B14, Sn)

72-C. A Laboratory Study of the Influence of Ferricyanide on the Extraction of Gold. G. L. Putnam. *Journal of the Chemical Metallurgical & Mining Society of South Africa,* v. 50, Mar. 1950, p. 228-231.

Investigation to find an economical method for converting ferrocyanides to ferricyanides in the presence of sodium cyanide, and to stabilize the resulting solutions. The reactions of the Adair-Usher modification of the cyanide process. (C24, Au)

73-C. Development of Mechanical Puncher at the McGill Smelter. Leonard Larson. *Journal of Metals,* v. 188, July 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 929-932.

Equipment designed to punch the tuyeres of copper converters, otherwise a difficult, disagreeable, and hazardous job. (C21, Cu)

74-C. Natural Gas Supplies Power To Make Aluminum. *Steel,* v. 127, July 3, 1950, p. 102, 104.

Low-cost electric power sources at Alcoa's Point Comfort Works increase aluminum production by 114 million pounds. (C23, Al)

75-C. Electrothermal, Electrolytic, and Electrostatic Processes, and Electric Welding; A Review of Progress. J. W. Cuthbertson. *Proceedings of the Institution of Electrical Engineers,* v. 97, Pt. I, Mar. 1950, p. 43-60.

Covers principally a wide variety of metallurgical processes in which electricity is applied for smelting, refining, melting, heat treatment, electrolytic extraction of metals, electrodeposition, electropolishing, resistance and arc welding. Also electrolytic production of gases and electrostatic precipitation processes. 67 ref. (C21, C23, D5, J2, K1, K3, L17, L18)

76-C. Electrically-Operated Gold Cyanidation Plant. *Engineering,* v. 169, June 9, 1950, p. 649.

Equipment and procedures at El Sid gold mine in Egypt. (C24, Au)

77-C. "Alsithermic" Metallurgy. (In French.) Arturo Paoloni. *Journal du Four Electrique et des Industries Electrochimiques,* v. 59, Jan.-Feb. 1950, p. 18-20; Mar.-Apr. 1950, p. 44-46.

Discusses the possibility (on the basis of experimental investigations) of reducing various metallic ores using as reducing agent an alloy prepared in the electric furnace composed of 50% Al, 35% Si, 10% Fe, and 3% Ti. Such an alloy is readily obtainable from bauxite. Second part: "Alsithermic" reduction of roasted pyrites, of a manganese ore, and of a titanium ore. Production of synthetic corundum free of titanium. (C26)

78-C. Thermal Reduction of Alumina. (Importance of Rate of Heating on Results of the Reduction Process.) (In German.) E. J. Kohlmeyer and S. Lundquist. *Zeitschrift für anorganische Chemie,* v. 260, Dec. 1949, p. 208-230.

In the reduction of alumina with carbon, the undesirable formation of Al_4C_3 can be greatly reduced by

melting the Al_2O at the fastest possible rate. To prevent evaporation of Al and carbide, the temperature must be limited to 2100-2200° C. Reduction of Al_2O_3-SiO_2 mixtures. Al-carbide constitution diagram. 24 ref. (C21, Al)

79-C. Research on the Deposition of Electrolytic Manganese. I. (In Polish.) M. Perec. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 1, no. 2, 1949, p. 131-138.

Fundamental principles of the production of electrolytic manganese. Ammonia and ammonium salts displace the curve of cathodic polarization toward negative potential values. Current efficiency is graphed as a function of NH_4 and Mg salt concentration and of temperature of electrolysis. Influence of inhibitors on the course of electrolysis. 17 ref. (C23, Mn)

80-C. Cementation (Deposition) of Cobalt From Aqueous Solutions by Metallic Zinc. (In Russian.) D. M. Chizhikov and B. P. Kreingauz. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Mar. 1950, p. 394-400.

Separation of Co from Ni by deposition on Zn is possible only when the Co concentration in the solution exceeds by at least twice that of Ni, at initial Co concentration of 1 g. per liter. Influence of temperature change and of different Co concentrations on kinetics of the process of electrodeposition of Co. Method of investigation. (C23, Co, Zn)

81-C. Vacuum Metallurgy—A New and Growing Industry. A. W. Schlechten. *Engineering and Mining Journal,* v. 151, July 1950, p. 71-73.

Applications to reduction of Mg, Ca, Na, Li, and Ba ores and compounds. Possible application to reduction of Zn by vacuum reaction with Fe, to reduction of nonvolatile metal compounds (metal remains in place), to separation of metals from alloys by vacuum distillation, to vacuum casting, and other possibilities. (C25)

82-C. Improvements in the Electrowinning of Chromium. R. R. Lloyd, J. B. Rosenbaum, V. E. Homme, L. P. Davis, and C. C. Merrill. *Journal of the Electrochemical Society,* v. 97, July 1950, p. 227-234.

Improvements in electrowinning of Cr from trivalent or "chrome alum" solutions, made since publication of a previous paper. Elimination of sodium sulfate from the electrolyte and changes in cell design have decreased the cost. Sensitivity of laboratory-size cells to certain critical impurities and other variables tends to obscure possibilities of this type of electrolyte. Research in pilot-plant cells shows that proper cell design and operation on a sufficiently large scale can largely overcome the sensitivity of chromium sulfate electrolytes to impurities and, to a lesser extent, to pH and other variables. (C23, Cr)

83-C. The Production of Beryllium. (In German.) Gustav Jaeger. *Metall,* v. 4, May 1950, p. 183-191.

Production methods, from reduction of Be compounds to refining of the metal. The most recent processes, namely chemical and electrolytic, are described in detail. Numerous references (mostly to patents). (C23, C general, Be)

84-C. New Process Produces Ductile Chromium Sheet. *Steel,* v. 127, July 24, 1950, p. 61-62.

New processes developed by U. S. Bureau of Mines' Northwest Development Laboratory, Albany, Ore.

Upon heating to above 500° C., the sheet can be bent and cut as easily as mild steel. Metal may be made by electrolytic reduction of a hexavalent salt or by reduction of the chloride with Mg. The spongy product is treated with HNO_3 to eliminate MgO, deoxidized with Zr hydride, ground to −65 mesh, pressed, sintered, and hot pressed in an iron sheath. (See item 85-C, below.) (C23, H14, Cr)

85-C. Ductile Chromium. W. J. Kroll, W. F. Hergert, and L. A. Yerkes. **Journal of the Electrochemical Society,** v. 97, Aug. 1950, p. 258-264.

Effect of oxide content on malleability. Low-oxide Cr was made by reduction with Mg of chromium chloride in a carrier salt under helium, and separation of the $MgCl_2$ and excess Mg by evaporation in a vacuum at elevated temperature. The metal powder obtained, as well as powdered electrolytic Cr, can be deoxidized with dry hydrogen at 1000° C. A special hydride furnace is used to generate and circulate high-purity hydrogen. The deoxidized chromium is sintered and the sheathed ingots can be hot rolled after hot compressing. The Cr sheet is malleable above 500° C., but is brittle when cold. 27 ref. (C23, H14, Cr)

86-C. Alcoa's New Plant at Point Comfort, Texas. *Metal Progress,* v. 58, July 1950, p. 56-59.

Equipment and procedures for electrolytic reduction of aluminum. (C23, Al)

87-C. Rate of Evaporation of Zinc at Low Pressures. H. W. St. Clair and M. J. Spendlove. *U. S. Bureau of Mines,* Report of Investigations 4710, June 1950, 13 pages.

The effect of temperature, pressure, stirring, and of cross section and length of vapor path on rate of evaporation. (C22, P12, Zn)

88-C. Spectrographic Control in the Refining of Metals. D. M. Smith. *Institution of Mining and Metallurgy.* "The Refining of Non-Ferrous Metals —A Symposium, 1950, p. 35-44; discussion, p. 45-50.

Previously abstracted from Preprint No. 1, July 1949. See item 2C-48, 1949. (C general, S11)

89-C. Problems in the Production of Some of the Rarer Metals. Alan R. Powell. *Institution of Mining and Metallurgy.* "The Refining of Non-Ferrous Metals—A Symposium", 1950, p. 51-66; discussion, p. 66-72.

Previously abstracted from Preprint No. 4, July 1949. See item 2C-51, 1949. (C23, C21, C26, EG-b)

90-C. The Refining of Gold and Silver. A. E. Richards. *Institution of Mining and Metallurgy.* "The Refining of Non-Ferrous Metals—A Symposium," 1950, p. 73-118; discussion, p. 130-143.

Previously abstracted from Preprint No. 2, July 1949. See item 2C-49, 1949. (C general, Ag, Au)

91-C. The Precious Metals. H. Gordon Dale. *Institution of Mining and Metallurgy.* "The Refining of Non-Ferrous Metals—A Symposium", 1950, p. 119-130; discussion, p. 130-143.

Previously abstracted from Preprint No. 5, July 1949. See item 15-58, 1949.
(C general, A8, Ag, Au, EG-c)

92-C. The Fire Refining of Copper. H. J. Miller. *Institution of Mining and Metallurgy.* "The Refining of Non-Ferrous Metals—A Symposium", 1950, p. 145-184; discussion, p. 227-244.

Previously abstracted from Preprint No. 6, July 1949. See item 2C-52, 1949. (C21, Cu)

93-C. The Electrolytic Copper Refinery of the Rhodesia Copper Refineries, Ltd., at Nkana, Northern Rhodesia. W. J. Friggens, Eric W. Page, and Thomas Milligan. *Institution of Mining and Metallurgy.* "The Refining of Non-Ferrous Metals—A Symposium," 1950, p. 203-227; discussion, p. 227-244.

Refinery has a capacity of approximately 60,000 long tons per annum. Proposed future extensions.
(C23, Cu)

94-C. The Refining of Bismuth. Alan R. Powell. *Institution of Mining and Metallurgy.* "The Refining of Non-Ferrous Metals—A Symposium", 1950, p. 245-253; discussion, p. 253-257.

Previously abstracted from Preprint No. 3, July 1949. See item 2C-50, 1949. (C general, Bi)

95-C. Cobalt Refining at Rainham Works of Murex, Ltd. P. S. Bryant. *Institution of Mining and Metallurgy.* "The Refining of Non-Ferrous Metals—A Symposium", 1950, p. 259-273; discussion, p. 273-279.

Previously abstracted from Preprint No. 17, July 1949. See item 2C-57, 1949. (C general, Co)

96-C. The Refining of Lead and Associated Metals at Port Pirie, South Australia. Frank A. Green. *Institution of Mining and Metallurgy.* "The Refining of Non-Ferrous Metals—A Symposium", 1950, p. 281-316; discussion, p. 316-325.

Previously abstracted from Preprint No. 9, July 1949. See item 2C-53, 1949. (C21, B15, Pb)

97-C. Refining of Zinc. Stanley Robson. *Institution of Mining and Metallurgy.* "The Refining of Non-Ferrous Metals—A Symposium", 1950, p. 327-342; discussion, p. 342-346.

Previously abstracted from Preprint No. 10, July 1949. See item 2C-54, 1949. (C21, C22, Zn)

98-C. Refining of Tin. E. H. Jones. *Institution of Mining and Metallurgy.* "The Refining of Non-Ferrous Metals —A Symposium", 1950, p. 347-363; discussion, p. 363-366.

Flotation, acid leaching, smelting, liquation, electrolysis, distillation, and specialized processes.
(C general, Sn)

99-C. Tungsten: Its Preparation for Use in Electronics and Carbide Products. T. F. Smeaton. *Institution of Mining and Metallurgy.* "The Refining of Non-Ferrous Metals—A Symposium", 1950, p. 367-386; discussion, p. 387-390.

Previously abstracted from Preprint No. 18, July 1949. See item 2C-58, 1949. (C general, W)

100-C. The Production of Ductile Zirconium. G. L. Miller. *Institution of Mining and Metallurgy.* "The Refining of Non-Ferrous Metals—A Symposium", 1950, p. 391-402; discussion, p. 402-405.

Previously abstracted from Preprint No. 19, July 1949. See item 2C-59, 1949. (C general, Zr)

101-C. The Refining of Magnesium. E. F. Emley. *Institution of Mining and Metallurgy.* "The Refining of Non-Ferrous Metals—A Symposium", 1950, p. 407-437; discussion, p. 437-443.

Previously abstracted from Preprint No. 12, July 1949. See item 2D-21, 1949. (C general, Mg)

102-C. Refining of Aluminium. J. Waddington. *Institution of Mining and Metallurgy.* "The Refining of Non-Ferrous Metals—A Symposium", 1950, p. 445-460.

Previously abstracted from Preprint No. 13, July 1949. See item 2D-22, 1949. (C general, Al)

103-C. Catalytic Distillation of Aluminium. P. Gross. *Institution of Mining and Metallurgy.* "The Refining of Non-Ferrous Metals—A Symposium", 1950, p. 461-470; discussion, p. 470-475.

Previously abstracted from Preprint No. 14, July 1949. See item 2D-23, 1949. (C22, Al)

104-C. The Aluminothermic Process and the Preparation of Commercially Pure Chromium, Manganese, and Special Alloys Such as Ferro Columbium. T. Burchell. *Institution of Mining and Metallurgy.* "The Refining of Non-Ferrous Metals—A Symposium", 1950, p. 477-496; discussion, p. 496-504.

Previously abstracted from Preprint No. 14, July 1949. See item 2C-55, 1949.
(C26, Cr, Mn, Cb, Fe-n)

105-C. Low-Carbon Ferro Chrome (0.03% C-0.15% C). J. A. Blake. *Institution of Mining and Metallurgy.* "The Refining of Non-Ferrous Metals—A Symposium", 1950, p. 505-513; discussion, p. 513-515.

Previously abstracted from Preprint No. 16, July 1949. See item 2C-56, 1949. (C21, Cr, Fe-n)

106-C. Viscosity of Fused Cryolite Baths for Electrolysis of Aluminum. (In Italian.) A. Vayna. *Alluminio,* v. 19, No. 2, 1950, p. 133-145.

Methods for measuring the viscosity of cryolite baths, indicating their physical principles. Diagrams indicate the dependence of viscosity of binary and ternary mixtures on temperature, and the comparative viscosity of typical baths. Method of application of the diagrams to industrial production of aluminum. (C23, P10, Al)

107-C. Investigations on Calcined Pyrites Containing Zinc. Part I. Reducibility of Ferric Oxide and Zinc Oxide in Calcined Pyrites. (In Polish.) M. Smialowski. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 1, No. 2 1949, p. 105-109.

Reducibility of pure Fe_2O_3, ZnO, Zn ferrite, and calcined pyrites containing 49.74% Fe and 9.65% Zn was investigated using H_2, coke-oven gas or coke as reducing agents. Results show that the reducibility of Fe_2O_3 in pure form and combined with ZnO is rather small. On the contrary, the reducibility of ZnO combined with Fe_2O_3 is much lower than that of pure ZnO. 14 ref. (C21, C22, Fe, Zn)

108-C. Electric Heating in Production of Ferrosilicon Alloys. (In Russian.) Ya. S. Shchedrovitskii. *Elektrichestvo* (Electricity), Mar. 1950, p. 70-71.

The contradictory views of several experts concerning processes taking place in furnaces for production of ferrosilicon were investigated. Basic assumptions of Sisoyan are clarified on the basis of experimental data, and it is shown that furnaces do not always operate most efficiently at the highest voltages. (C21, Fe)

109-C. Ferrochromium From Low Grade Chromite Ores and Concentrates. F. W. Wessel and R. T. C. Rasmussen. *Journal of Metals,* v. 188, Aug. 1950, p. 984-988.

Experimental work on a Montana chromite concentrate produced by a Defense Plant Corp. mill using two available reductants (an Oregon sub-bituminous coal and a char made from this coal.) Crucible tests were followed by batch tests in a 500-lb. arc furnace. Finally, one continuous, open-top smelting test was made in a Type ST, 2000-lb. Lectromelt furnace. Results indicate feasibility of the process. 11 ref. (C21, Fe-n, Cr)

110-C. The Electrical Resistivity of Titanium Slags. James L. Wyatt. *Journal of Metals,* v. 188, Aug. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 989-994.

Specific electrical resistivities of Ti-containing slags, with iron oxide contents of 2-30%. Values of resistivity as a function of iron oxide content indicate that Ti slags are in general very low in specific electrical resistivity as compared with siliceous slags. Results obtained in connection with a study of the electric-furnace smelting of ilmenite ores to produce a slag rich in Ti, with pig iron as a byproduct. 12 ref. (C21, D5, B21, Ti, Fe)

111-C. Mechanical Converter Tuyere Punching at the McGill Smelter. John B. Huttl. *Engineering and Mining Journal,* v. 151, Aug. 1950, p. 84-86.

Equipment for mechanical punching of copper converter tuyeres. The machinery has eliminated a difficult, disagreeable, and hazardous job, has increased production rate about 20%, and has reduced refractory consumption. (C21, Cu)

112-C. "Hardeners" for Copper-Base Alloys. E. Voce. *Murex Limited Review*, v. 1, no. 6, 1950, p. 101-105.

The various binary and more complex alloys which are introduced into the molten metal in order to deoxidize it and to modify its properties. (C21, Cu)

113-C. Melting and Casting of Non-Ferrous Metals. G. L. Bailey and W. A. Baker. *Institute of Metals*, "Symposium on Metallurgical Aspects of Non-Ferrous Metal Melting and Casting of Ingots for Working", 1950, p. 7-32.

Previously abstracted from *Journal of the Institute of Metals*, item 14C-13, 1949. (C5, E25, C21, N12)

114-C. Melting and Casting Aluminium Bronze Ingots for Subsequent Working. A. J. Murphy and G. T. Callis. *Institute of Metals*, "Symposium on Metallurgical Aspects of Non-Ferrous Metal Melting and Casting of Ingots for Working", 1950, p. 47-60.

Previously abstracted from *Journal of the Institute of Metals*, item 14C-15. 1949. (C5, Cu)

115-C. The Melting and Casting of Brass. Maurice Cook and N. F. Fletcher. *Institute of Metals*, "Symposium on Metallurgical Aspects of Non-Ferrous Metal Melting and Casting of Ingots for Working", 1950, p. 75-94.

Previously abstracted from *Journal of the Institute of Metals*, item 14C-17, 1949. (C5, Cu)

116-C. The Melting and Casting of Nickel Silver at the Works of Messrs. Henry Wiggin and Co., Ltd. E. J. Bradbury and P. G. Turner. *Institute of Metals*, "Symposium on Metallurgical Aspects of Non-Ferrous Metal Melting and Casting of Ingots for Working", 1950, p. 95-112.

Previously abstracted from *Journal of the Institute of Metals*, item 14C-18, 1949. (C5, Cu)

117-C. The Distribution of Several Metals Between Matte and Speiss (Sulfide and Arsenide Phase) in the Melt. (In German.) Friedrich Leutwein. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 3, Jan. 1950, p. 1-6.

Upon melting of cuprous sulfide and nickel arsenide, as examples of metallurgical mattes and speisses, two phases which are immiscible in the molten state are obtained. The distribution of different metals, added in small amounts to this system, between the two phases was investigated. Eighteen metallic elements are arranged in order of decreasing tendency to enter the sulfide phase. Significance of results for theoretical metallurgy. (C21)

118-C. Separation of Iron From Arsenic-Containing Cobalt Speisses. (In German.) Friedrich Johannsen and Werner Schwartz. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 3, May 1950, p. 138-144.

Experiments show that the removal of Fe from Co speisses through the molten slag follows very closely the law of mass action. Arsenic has practically no effect on the equilibrium, but permits melting at lower temperatures. Sulfur interferes with slagging of the Fe. 13 ref. (C21, Co)

119-C. "Modification" Treatment of Aluminum-Silicon Alloys. (In Portuguese.) Clovis Bradaschia. *Boletin da Associacao Brasileira de Metais*, v. 6, Jan. 1950, p. 26-46.

Use of metallic sodium and various salts containing Na or K for refining Al-Si alloys by addition to the molten metal. Effects of the treatment on chemical and physical properties and microstructure. 12 ref. (C21, Al)

120-C. Treatment of Tin Smelter By-Products. C. W. Jensen. *Mining Magazine*, v. 82, Feb. 1950, p. 73-75.

Treatment in a small continental converter plant is described with details regarding the handling of hard tin high in Fe and As, and of Sn-Pb-Sb-Cu alloys high in Cu. (C21, Sn)

121-C. Lead Smelting at Przibram. C. W. Jensen. *Mining Magazine*, v. 83, July 1950, p. 9-11.

Practice at a Czechoslovakian center. Includes flow diagram. Silver and gold are also recovered. (C21, Pb, Ag, Au)

122-C. Semi-Rotary Furnaces; Efficient Melting Units for Non-Ferrous Metals. *Metal Industry*, v. 77, Aug. 11, 1950, p. 90.

Construction of furnace. Heating is provided by oil fuel burners or gas injectors. Furnaces are said to be efficient and economical for bronze, gunmetal, copper, light alloys, etc. (C21, Cu, Al)

123-C. Milestones in the Non-Ferrous Metallurgical Industry. W. H. Dennis. *Mine & Quarry Engineering*, v. 16, Sept. 1950, p. 292-293.

Pyrometallurgy, electrometallurgy, hydrometallurgy, and ore dressing. (C general, B general, EG-a)

124-C. The Action of Sulphide Ion and of Metal Salts on the Dissolution of Gold in Cyanide Solutions. C. G. Fink and G. L. Putnam. *Mining Engineering*, v. 187, Sept. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 187, 1950, p. 952-955.

Above was studied by determining the time required for the solvents to dissolve gold leaf. Minute traces, even 0.5 ppm., of sulfide ion retard the dissolution of gold. On the other hand, traces of the salts of Pb, Bi, Hg, and Tl considerably accelerate the dissolution. The beneficial effect of Pb is dependent upon pH and cyanide-ion concentration. (C24, Au)

125-C. Reduction in Oxygen of Cr_2O_3 by Hydrogen in a Solar Furnace. (In French.) Félix Trombe and Marc Foëx. *Comptes Rendus* (France), v. 230, June 26, 1950, p. 2294-2296.

Laboratory technique, indicating theoretical bases of the reaction. Cr obtained was of a high degree of purity (99.99%). The apparatus may be used for other treatments under different conditions and atmospheres. (C2, Cr)

126-C. Electrode Potentials and Electroconductivity of Solutions During Electrolytic Production of Manganese. (In Russian.) I. Ya. Garkavi and V. V. Stender. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 23, June 1950, p. 599-606.

Experimentally investigated for different temperatures and different compositions of electrolyte. Logarithmic dependence of anodic and cathodic potentials on current density. Behavior of pure Pb alloy and Pb containing 1% Ag as anodes. 21 ref. (C23, Mn)

127-C. Electrolytic Production of Highly Dispersed Porous Lead. (In Russian.) N. T. Kudryavtsev and E. A. Tereshkovich. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 23, June 1950, p. 607-612.

Investigation of conditions for the electrodeposition of Pb on the cathode in spongy form established relations between composition of electrolyte and maximum safe current densities on cathode and anode at different temperatures. An excess of soda in the electrolyte passivates the anode while glycerine activates it. 15 ref. (C23, Pb)

128-C. Conductivity of Molten Cryolite Baths for Electrolytic Production of Aluminium. (In Italian.) A. Vayna. *Alluminio,* v. 19, no. 3, 1950, p. 215-224.

Physical principles and practical methods for measurement of bath conductivity. Results of numerous determinations on binary and ternary mixtures at different temperatures. Influence of changes in electrical conductivity on thermal equilibrium of the cells. (C23, Al)

129-C. Electrolytic Production of Manganese. (In Swedish.) Bengt Sandberg. *Jernkontorets Annaler,* v. 134, no. 4, 1950, p. 172-188.

Literature review. 69 ref. (C23, Mn)

130-C. Investigation of Electrodeposition of Manganese. Part II. (In Polish.) M. Perec. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 2, no. 2, 1950, p. 93-99.

Effects of Fe^{++}, Fe^{+++}, Pb^{++}, Ni^{++}, and Cu^{++} ions on current efficiency. Cathodic polarization curves were determined for a bath with Co additions, and for $(NH_4)_2SO_4$ and Na_2SO_3 baths. Rapid polarographic method for Co determination in the bath for hydrometallurgy of Mn. (C23, Mn)

131-C. Applications of Amalgam Metallurgy. H. Hohn. *Research,* v. 3, Sept. 1950, p. 407-417.

Various selected techniques as follows: example of a filtration process: extraction of aluminum from AlFeSi; extraction of metallic sodium; a special case of the alkali-chloride electrolysis process; example of semi-electrolysis; processing Zn-alloy scrap; example of blocking electrolysis; extraction of Zn of 99.999% purity from the purple ore; example of indirect amalgam electrolysis; extraction of electrolytic lead from low-grade Zn ores; example of a concentration transforming process; extraction of rare Zn satellites; example of a continuous process for separation of multimetallic mixtures by means of a progressive phase exchange based on complex potentials; alkaline-processing of rotary kiln oxides; and example of dry evaporation process. (C29, B14, EG-a)

132-C. By-Products of Amalgam-Type Chlorine Cell. Robert B. MacMullin. *Chemical Engineering Progress* (Engineering Section), v. 46, Sept. 1950, p. 440-455.

Technical basis for the formation and utilization of amalgams. Processes for production of free metals such as Na, K, Li, Zn, and Pb by two different techniques: distillation of mercury from the amalgam; and electrodeposition. Production of caustic alkalies. Use of amalgams for organic reductions. Use for phase-exchange reactions and reduction of metallic chlorides with sodium amalgam to produce such metals as Ti and Zr. 34 ref. (C29, EG-e, d, Zn Pb)

133-C. The Production of Reactive Metals. L. M. Pidgeon. *Canadian Mining and Metallurgical Bulletin,* v. 43, Sept. 1950, p. 515-524; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 53, 1950, p. 363-372.

Extractive metallurgy of metals located above Mn in the electrochemical series and in the free-energy-of-formation series for the corresponding metallic oxides. General principles, basic production methods, and detailed methods for specific metals (Na, K, Li, Mg, Ca, Be, Al, Ti, Zr, and Th). 18 ref. (C general, EG-a)

134-C. The Oxidation of Cadmium and Cadmium-Alloy Melts. (In German.) Wolfgang Gruhl and Günter Wassermann. *Zeitschrift für Metallkunde,* v. 41, June 1950, p. 178-184.

Oxidation of calm Cd melts is a pure diffusion process. The oxide formed is not CdO but an unknown oxide phase. Pb, Bi, and Cu up to 1% do not affect the oxidation of Cd. 0.05% Zn suppresses the oxidation completely; while it is greatly increased by small additions of Mg, Sn, and Sb, forming a spongy oxide. (C21, Cd)

135-C. Commercial Production of Pigs, Ingots, and Castings of Magnesium Alloys Containing Zirconium. (In German.) F. Sauerwald. *Chemische Technik,* v. 2, June 1950, p. 183-185.

Procedures and results, including a discussion of Mg alloys containing Zn and Cd as well as Zr. (C5, Mg)

136-C. The Electrolysis of Aluminum Chloride. (In German.) Hans Grothe. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 3, July 1950, p. 213-220.

Conditions under which $AlCl_3$ can be used for production and refining of Al. Vapor pressure data on $AlCl_3$-containing melts show that such melts of a certain composition range can be successfully used as electrolytes. Graphite anodes, which are rapidly destroyed below 450° C., are durable at about 700° C. If the raw material consists of bauxite, Fe must first be removed. 28 ref. (C23, Al)

137-C. Contribution to Information Concerning the Electrometallurgy of Aluminum. (In German.) J. E. Boner. *Helvetica Chimica Acta,* v. 33, Aug. 1, 1950, p. 1137-1153.

A comprehensive critical review; application of modern theories of coordination valency of complex groups of atoms or molecules. Indicates the direction in which theoretical and experimental study must proceed in order to achieve further advances in this field. 25 ref. (C23, Al)

138-C. Recent Developments in Metallurgical Practice at Trail, B. C. D. D. Howat. *Mine & Quarry Engineering,* v. 16, Oct. 1950, p. 319-326.

Equipment and procedures. Pb and Zn are the main products. Ag, Cd, Bi, Sb, In, and Sn are byproducts. Ore beneficiation, roasting, and sintering; but emphasizes smelting and refining.

(C21, B general, Zn, Pb, EG-a)

139-C. Repca's Ore Hearth Output Set Record During World War II. John S. Stewart. *Engineering and Mining Journal,* v. 151, Oct. 1950, p. 92-95.

Lead smelter and refinery at Zvecan, Jugoslavia, on the basis of prewar information. It was the first hearth plant to run wholly on flotation concentrates. Products were low-Bi refined lead, silver, 99.9% Bi, fused $ZnCl_2$, and Ca-Pb alloy. (C21, Pb, Bi)

140-C. Improvements in Methods for the Reduction of Zirconium Chloride With Magnesium. W. J. Kroll, W. F. Hergert, and L. A. Yerkes. *Journal of the Electrochemical Society,* v. 97, Oct. 1950, p. 305-310.

Gaseous $ZrCl_4$ can be piped to a reactor containing Mg and the reaction salts can be repeatedly tapped to make room for more Mg, in order to continue the reduction. This permits using crucible capacity more fully, with consequent reduction of production cost. Part of the Mg can be replaced with Na. Cast iron is shown to be a better crucible material than mild steel when used in contact with hot Zr. A layer of zirconium carbide is formed by diffusion, which helps reduce iron contamination. 10 ref. (C26, T5, Zr, CI)

141-C. Preparation of Ductile Vanadium by Calcium Reduction. R. K. McKechnie and A. U. Seybolt. *Journal of the Electrochemical Society,* v. 97, Oct. 1950, p. 311-315.

Method for preparing ductile V of about 99.5% purity by Ca reduction of V_2O_5. On the scale investigated, metal so reduced collects in a solid mass weighing about 100 g. and can be cold worked directly to thin foils without annealing. 10 ref. (C26, V)

142-C. Preparation and Properties of Titanium-Chromium Binary Alloys. D. J. McPherson and M. G. Fontana. *American Society for Metals,* Preprint No. 40, 1950, 28 pages.

Two furnaces developed for induction and arc melting. Chemical, spectrographic, and vacuum-fusion analyses, hardness and hot hardness, room-temperature tensile and impact properties, stress-rupture prop-

erties, elevated-temperature oxidation resistance, and metallographic and X-ray studies are reported for arc-melted alloys. Data are tabulated and plotted. 16 ref.
(C21, Q general, M21, Cr, Ti)

143-C. Losses at Electrode Contacts in Electrolytic Zinc Baths. (In Russian.) A. V. Troyanovskii. *Promyshlennaya Energetika* (Industrial Power), v. 7, July 1950, p. 12-13.

Existing electrode designs and their influence on losses of electrical energy. Proposes basic improvements. The cathode, at present made of Al and Cu strips, should be entirely composed of Al; the anode should be left unchanged. Optimum conditions for electrolysis. (C23, Zn)

144-C. Semicontinuous Casting of **Bronze Rod.** *Metal Progress*, v. 58, Oct. 1950, p. 536, 538. Condensed from *Tin Research Institute*, "Production in Simple Semi-Continuous Casting Machine", by W. T. Pell-Walpole and V. Kondic.

Equipment for the above.
(C5, Cu)

145-C. Beryllium. *Metal Progress*, v. 58, Oct. 1950, p. 566, 570, 572. Condensed from BIOS Report No. 25, "The Nonferrous Metal Industry in Germany, 1939-1945".

Production by the Degussa chloride process and the Sappi modified-fluoride process. How the flakes produced are processed into usable forms. Applications.
(C general, T general, Be)

146-C. The Development of the Lead Blast Furnace at Port Pirie, South Australia. L. A. White. *Journal of Metals*, v. 188, Oct. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 188, 1950, p. 1221-1228.

Developments from the original standard furnace to the present wide-shaft type, with two superimposed rows of tuyeres. Metallurgical operations of the blast-furnace section. (C21, Pb)

147-C. Recovery of Sulphur From Smelter Gases by the Orkla Process at Rio Tinto. *Bulletin of the Institution of Mining and Metallurgy*, Nov. 1949, p. 25-31; Mar. 1950, p. 43-53.

Discussion of paper by H. R. Potts and E. G. Lawford (Apr. 1949 issue; see item 15-26, 1949). Nov. issue: Extensive analysis, including graphs and tables, by L. U. Salkfield; and brief remarks by N. E. Lenander. Mar. issue: Comparison of results at Rio Tinto with those of Orkla Metal-Aktieselskap, by E. Rich. Cross-sectional diagram shows proposed modification of the Rio Tinto plant. (C21, A8, Cu)

148-C. Experiments on the Removal of Selenium and Tellurium From Blister and Fire-Refined Copper. *Bulletin of the Institution of Mining and Metallurgy*, Nov. 1949, p. 37-38; Apr. 1950, p. 49-50.

Nov. issue: Remarks by F. D. L. Noakes concerning above paper by W. A. Baker and A. P. C. Hallowes. (Aug. 1949 issue; see item 2C-70, 1949). Apr. issue: Authors' reply. (C21, Cu, Se, Te)

149-C. Investigations on the Production of Electrolytic Cobalt From a Copper-Cobalt Flotation Concentrate. *Bulletin of the Institution of Mining and Metallurgy*, Dec. 1949, p. 41-46; Jan. 1950, p. 31-35; May 1950, p. 37-40.

General discussion on above paper by H. L. Talbot and H. N. Hepker (Sept. 1949 issue; see item 1C-70, 1949). Authors' replies in May issue. (C23, Co)

150-C. Polyphosphates in Cyanidation. Norman Hedley. *Bulletin of the Institution of Mining and Metallurgy*, Mar. 1950, p. 1-8, discussion, May 1950, p. 15-22; Sept. 1950, p. 23-24.

Difficulties caused by deposition of lime in cyanidation plants. The effect of polyphosphates as retarders of this deposition; experimental data on the efficiency of various polyphosphates. Examples of plant practice show that several of these salts are valuable in cyanidation plants. (C24, Au)

151-C. Equilibrium and Thermal Effect in the Aluminum-Subchloride Reaction. (In German.) Paul Weiss. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 3, Aug. 1950, p. 241-244.

Proves experimentally that Al can form—at elevated temperatures—monovalent compounds which again decompose into metallic Al and other products of the reaction. This fact opens a new way to produce highly pure Al. Recommends the endothermic reaction of Al with $AlCl_3$ to produce AlCl. The equilibrium at 1000, 1190, and 1200° C. at 1 atm. was established by a flow method. 17 ref. (C21, Al)

152-C. Hydrate Formation During Electrolysis of Nickel. (In Russian.) A. L. Rotinyan and V. Ya. Zel'des. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 23, July 1950, p. 717-723.

Influence of concentration of component parts of the electrolyte for

electrolytic refining of Ni on pH of the electrolyte at the beginning of hydrate formation was investigated. Effects of additions of Na_2SO_4, NaCl, and H_3BO_3. 10 ref. (C23, Ni)

153-C. Fuel Factors in Non-Ferrous Fabrication. Leslie Aitchison. *Institute of Fuel and Institute of Petroleum,* "Modern Applications of Liquid Fuels", 1950, p. 150-158; discussion, p. 158-176.

Factors affecting the choice of fuel for refining Cu and for melting and annealing Al, Cu, and Mg alloys. (C21, J23, Al, Cu, Mg)

154-C. Graphite-Rod Hairpin-Resistor Radiation Furnace for High Temperatures. W. J. Kroll, W. W. Stephens, and J. P. Walsted. *Journal of Metals,* v. 188, Nov. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1394-1395.

Furnace found to be well adapted for producing zirconium carbide from oxide at temperatures between 1800 and 2000° C. with 100% recovery of Zr content. It is believed that the furnace may be suitable for producing other high-melting carbides or borides. Performance data. (C21, C-n, Zr)

155-C. Production of Titanium From $TiCl_4$ in an Arc Furnace. L. D. Jaffe and R. K. Pitler. *Journal of Metals,* v. 188, Nov. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1396.

The furnace and results of preliminary investigation of the process. (C21, Ti)

156-C. Design and Control of Ferro-Alloy Furnaces. F. V. Andreae. *Transactions of the American Institute of Electrical Engineers,* v. 69, 1950, p. 557-562.

Previously abstracted from condensed version in *Electrical Engineering.* See item 67-C, 1950. (C21, Fe-n)

157-C. Operation of Pilot Plant for Reducing Zinc Concentrates With Methane Gas. R. D. Van Zante and C. H. Gorski. *U. S. Bureau of Mines,* Report of Investigations 4730, Oct. 1950, 13 pages.

Design and operation. A zinc-smelting run. Includes photograph of plant, diagram of smelting unit, and the gas-flow diagram. 13 ref. (C21, Zn)

158-C. Research on the Thermal Reduction of Magnesium Oxide. (In German.) Armin Schneider. *Zeitschrift für Metallkunde,* v. 41, July 1950, p. 205-212.

Methods for determining equilibria in the process, using as reducing agents ferrosilicon, calcium carbide, and Ca-Si alloys. Comparative measurements of reaction rates and factors affecting them. 26 ref. (C21, Mg)

159-C. Study by Electron Diffraction of Certain Reactions and Surface Structures of Metals; The Method of Vacuum Casting. (Concluded.) Robert Courtel. *Métaux et Corrosion,* v. 25, July-Aug. 1950, p. 188-199.

Surface reactions during casting in a controlled atmosphere. General characteristics of oxidation reactions during casting for the cases of Fe, Al, and Mg. Evidence for an "oxidation threshold", using an 80-20 Ni-Cr alloy as an example. A second method for determination of temperature attained during casting. An application of vacuum casting to the problem of oxidation of rare-earth metals. Evidence of the existence of the "C" form of Ce_2O_3 and data on its lattice constants. (C25, M21, R2)

160-C. Reduction of Pyrolusite Ore by Pyrite, Coke, Sulfur Dioxide, or Ferrous Sulfate. (In Polish.) M. Perec and K. Pinkas. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 2, no. 3, 1950, p. 187-195.

Difficulties involved in use of pyrite, coke, or SO_2 for this reduction. Advantages of use of hydrated ferrous sulfate (available from waste pickling solutions). Conditions necessary for quantitative reduction of MnO_2 to $MnSO_4$ were established. Difficulties connected with separation of $Fe(OH)_3$ were eliminated. A complete scheme for production of electrolytic Mn is proposed including reduction of ore, purification of solution, and regeneration of NH_3. 10 ref. (C23, A8, Mn)

161-C. New Electrolytic Process Produces High Purity Chromium. *Steel,* v. 127, Dec. 4, 1950, p. 92-94.

See abstract of "Improvements in the Electrowinning of Chromium", R. R. Lloyd, J. B. Rosenbaum, V. E. Homme, L. P. Davis, and C. C. Merrill, *Journal of the Electrochemical Society;* item 82-C, 1950. (C23, Cr)

162-C. Production of Malleable Zirconium on a Pilot-Plant Scale. W. J. Kroll, W. W. Stephens, and H. P. Holmes. *Journal of Metals,* v. 188, Dec. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1445-1453.

A pilot plant producing 600 lb. of Zr sponge per week comprises an arc furnace to make zirconium carbide, a chlorinator producing raw

chloride, a purification vessel to eliminate zirconium oxide and iron from this chloride, two reduction vessels, two vacuum retorts for salt separation, and a graphite-resistor vacuum furnace to melt ingots. Plant layout, power consumption, operation schedules, and production costs. (C21, C25, Zr)

163-C. A Device for Maintaining a Constant Potential for Electrochemical Work. F. W. Chambers. *Journal of Scientific Instruments,* v. 27, Nov. 1950, p. 292-294.

A relatively simple and inexpensive apparatus, which can be used to control accurately the potential of either working electrode during a number of electrolytic operations, such as cathode potential during fractional electrodeposition of metals from their mixed solutions. A circuit for the simultaneous control of several cells is indicated. 15 ref. (C23, L17)

164-C. Extraction of Germanium From Sphalerite Collected From Nepal. Part I. R. K. Dutta and S. N. Bose. *Journal of Scientific & Industrial Research,* v. 9B, Oct. 1950, p. 251-252.

A laboratory method for extraction of Fe from the magnetic fraction of sphalerite. This fraction contains 0.24% Ge. The ore is roasted to convert sulfide to sulfate and oxide. HCl is added and $GeCl_4$ is distilled off. (C22, B15, Ge)

165-C. The Fe-Sb-S Ternary System and Its Importance in the Production of Antimony by the Precipitation Method. (In German.) W. Lange and H. Schlegel. *Chemische Technik,* v. 2, Aug. 1950, p. 258-261.

Because of unsatisfactory results obtained from reduction of Sb_2S_3 with Fe, experiments were made in which Na_2SO_4, Na_2S, Na_2O, NaCl, or Na_2CO_3 were added. Best results were obtained when the reduction was performed in several steps using Na_2CO_3 and an excess of Sb_2S_3. 92-95% Sb of 99.8% purity was obtained. Constitution diagrams and graphs. (C26, M24, Sb)

166-C. Principles of the Electrothermal Production of Ferrotungsten. (In German.) Hermann Härter. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 3, Oct. 1950, p. 325-328.

Metallurgical and electrical methods for producing ferrotungsten containing 80% W. Special attention is paid to the selection of the best type of carbon and the optimum voltage. (C21, Fe-n, W)

167-C. Metallurgical Investigation of the Reduction of Mixed Oxides of Cobalt and of the Refining of Unrefined Cobalt. (In German.) Willy Hilgers. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 3, Oct. 1950, p. 334-341.

Experimentally established optimum conditions and procedures for production of unrefined cobalt from an ore consisting of mixed oxides of Co, Mn, and Fe. When refining the Co, very little slag formation by Co was caused by removal of Mn. On the other hand, removal of Fe causes extensive slag formation. 17 ref. (C21, Co)

168-C. The Metallurgy of Metallothermic Melting. (In German.) Wilhelm Dautzenberg. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 3, Oct. 1950, p. 341-347.

History and principles of the thermit melting process. Differences between this process and reduction by carbon. Heats of reaction in aluminothermic and ferrothermic reactions, as well as in endothermic secondary reactions. Industrial application of these methods. (C26)

169-C. Reduction and Dissociation of the Oxides of Cobalt and Nickel. (In Russian.) G. I. Chufarov, M. G. Zhuravleva, and E. P. Tatievskaya. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, Aug. 21, 1950, p. 1209-1212.

Results of laboratory investigation. Reduction was studied at 200, 250, 300, and 350° C. in hydrogen atmospheres at 100, 200, 300, and 400 mm. Hg. Purity of the oxides was 98-99%. 11 ref.
(C21, U2, Co, Ni)

170-C. Refining of Magnesium by Vaporization at Extremely Low Pressure. R. R. Rogers and G. E. Viens. *Journal of the Electrochemical Society,* v. 97, Dec. 1950, p. 419-424.

Experiments indicate that Mg alloy scrap may be refined by vaporization of the Mg at pressures less than 0.05 micron. The refined metal contains no Mn and only traces of Al, Si, Cu, and Fe. The Zn is vaporized also, but the Zn content of the refined Mg is substantially lower than that of the original charge. (C22, Mg)

171-C. The Relative Reliability of Aluminum and Zinc Starting Sheets for the Electrodeposition of Zinc. Glen C. Ware and Kenneth B. Higbie. *Journal of the Electrochemical Society,* v. 97, Dec. 1950, p. 425-429.

Zn sheet from three different sources, and Al sheet, were compared. The Al sheet was used with edge strips, as required by present commercial practice, and without edge strips. The materials were tested in electrolytes with a wide

range of impurity contents. Average residence period was used as the measure of reliability. (C23, Zn, Al)

172-C. Influence of Additions During Electrolytic Production of Zinc From Sulfate Solutions. (In Russian.) A. G. Pecherskaya and V. V. Stender. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 23, Sept. 1950, p. 920-935.

Experimental investigation showed that additions of ions of alkaline and alkaline-earth metals are detrimental because they decrease the electroconductivity of the solution and hinder diffusion of Zn ions to the cathode. Detrimental influences of additions of Mn, Ni, Co, Cu, As, and Ge ions are also explained. Results of increasing cathode current density and of "poisoning" the surface of the Zn cathode were investigated. 23 ref. (C23, Zn)

SECTION D

FERROUS REDUCTION and REFINING

1D. Electric Furnaces Now Challenge the Open Hearth. *Steel,* v. 125, Dec. 26, 1949, p. 72, 74.

Summarizes proceedings of 7th annual Electric Furnace Steel Conference of the Iron and Steel Division, AIME, Pittsburgh, Dec. 8-10, 1949. (D5)

2D. Extra Coke Vs. Burden Cut. Kurt Newstaeder. *Blast Furnace and Steel Plant,* v. 37, Dec. 1949, p. 1443-1446.

Two basic methods are used to change the ore-coke ratio in blast-furnace charges. Some operators increase the amount of coke while others increase or decrease the ore charge. Pros and cons of the two methods. (D1)

3D. Manufacture of Sponge Iron—Literature Report No. 2. B. R. Nijhawan and P. K. Gupte. *Journal of Scientific & Industrial Research,* v. 8, Nov. 1949, p. 441-446.

Methods developed by the U. S. Bureau of Mines, the Swedish Wiberg process; and the German Krupp and Krupp-Renn processes. 33 ref. (D8, Fe)

4D. The Thermodynamic Background of Iron and Steel Making Processes. I. The Blast-Furnace. F. D. Richardson and J. H. E. Jeffes. *Journal of the Iron and Steel Institute,* v. 163, Dec. 1949, p. 397-420.

Thermodynamic data available for the main compounds of importance in the blast furnace. Free-energy and heat changes of the most important reactions calculated up to 2000° C.; the manner in which they vary with temperature. Results are applied to processes occurring in the blast furnace. 72 ref. (D1, P12)

5D. A New Blast-Furnace Stock-Rod Gas-Seal. E. J. Walklate. *Journal of the Iron and Steel Institute,* v. 163, Dec. 1949, p. 432.

New equipment which gives much more satisfactory results than that used previously. (D1)

6D. Electric Steel Furnace Meeting: Automatic Controls Increase Furnace Output. *Iron Age,* v. 164, Dec. 29, 1949, p. 43-45.

Abstracts of papers covering advantages of automatic controls in raising output, induction stirring of the bath, and effect of large transformers on rate of production. (D5)

7D. Increased Open Hearth Production by Improved Charging Methods. *Industrial Heating,* v. 16, Dec. 1949, p. 2180, 2182, 2184. Based on paper by R. Tietig, Jr.

Practical recommendations. (D2)

8D. Reladling To Obtain Uniform Bath Composition. J. J. Green. *Journal of Metals* (Technical Section), v. 188, Jan. 1950, p. 16F.

Process used by Universal-Cyclops Steel Corp. on all straight-Cr stainless iron alloys and Cr-Ni stainless grades. A portion of the metal is tapped out, then poured back into the furnace over the lip of the ladle, thus duplicating to some extent, the type of mechanical mixing that occurs during tapping of a heat. This practice has resulted in complete elimination of discrepant results due to an insufficiently mixed bath. (D9, SS)

9D. Results of Optimum Current Control on Electric Furnaces. L. A. Wynd. *Journal of Metals* (Technical Section), v. 188, Jan. 1950, p. 17-21.

Records of actual heats indicate advantages resulting from automatic current settings, as compared with those obtained with the furnace operator adjusting current settings by hand and by guess. (D5)

10D. Recent Developments in Open-Hearth Furnace Design and Operation. A. H. Leckie. *Engineering,* v. 168, Dec. 2, 1949, p. 599-601; Dec. 9, 1949, p. 627-629.

(D2)

11D. Observations Concerning Desulfurization in a Basic Electric Furnace. (In French.) *Journal du Four Electrique et des Industries Electrochimiques,* v. 58, July-Aug. 1949, p. 87-88.

Factors influencing the process of desulfurization. Basic theory of Schenk is analyzed. (D5)

12D. The Extraction of Manganese-Rich Slags for the Production of Ferromanganese in the Blast-Furnace Smelting of Ore. (In German.) Jacob Willems and Paul Ischebeck. *Stahl und Eisen,* v. 69, Nov. 10, 1949, p. 809-813.

Recommendations for the production of blast-furnace slags with a favorable Mn-Fe ratio. Experimental method; type of furnace used. (D1)

13D. Solidification of Steel in the Continuous Casting Process. (In German.) Helmut Krainer and Bruno Tarmann. *Stahl und Eisen,* v. 69, Nov. 10, 1949, p. 813-819.

Conditions for successful application of the continuous-casting process. Measurements of heat transfer from ingot to chill mold and cooling water are used for development of optimum chill-mold design. Properties and structures of continuously cast steel ingots. 15 ref. (D9)

14D. The Slag-Reduction Process in the Openhearth Furnace. (In German.) Erich Voogdt. *Stahl und Eisen,* v. 69, Nov. 10, 1949, p. 843-844.

Melting procedure for a high-Si steel. Initial addition of only 4.5 kg. Si per ton of steel permits close control of the melting process. (D2)

15D. The Melting of Basic Electric-Furnace Steel. (In German.) E. Diepschlag and H. Muller. *Archiv für Metallkunde,* v. 3, Nov. 1949, p. 369-376.

The most important melting methods, reactions that occur in the basic electric arc furnace at various stages of the melting process, and the most desirable melting conditions. The problem of producing high-quality steels from the more readily available iron and steel scrap. Several types of steel can be successfully deoxidized by adding Al at the beginning of the refining process. 42 ref. (D5)

16D. Determination of Slag Viscosity From the Melting Curve of the Steel. (In Russian.) V. T. Braza. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Oct. 1949, p. 1206-1209.

A newly developed immersion viscosimeter. Mathematical theory of this method. Two variations of the apparatus. (D general, P10)

17D. Open Hearth Furnace Charging. Harold Carrington Wood. *Engineer,* v. 188, Dec. 23, 1949, p. 724-726; Dec. 30, 1949, p. 756-757.

Equipment and procedure. Future possibilities. (D2)

18D. Destruction of Steel-Pouring Equipment During Production of High-Quality Steel. (In Russian.) V. P. Remin and A. M. Ruchushkin. *Ogneupory* (Refractories), v. 14, Aug. 1949, p. 346-349.

Structure of refractory steel-pouring equipment and the effect of its composition on the steel obtained were investigated, especially for ball-bearing steel. (D9, SG-c)

19-D. Hot Top Efficiency Improved. J. W. Mueller and G. A. Bole. *Steel,* v. 126, Jan. 23, 1950, p. 80, 82, 84.

Hot tops with substantially reduced volumes are expected in the near future as a result of recent investigations with light-weight refractory materials and insulating covers on 3x3 to 25x25-in. steel ingots. Experimental results. (D9, ST)

20-D. Review of Open Hearth Practice. E. G. Hill. *Blast Furnace and Steel Plant,* v. 38, Jan. 1950, p. 63-64.

Reviews 1949 developments. (D2)

21-D. Developments in the Steel Plant Combustion Field. H. V. Flagg. *Blast Furnace and Steel Plant,* v. 38, Jan. 1950, p. 67-70.

Developments in fuels and furnaces. (D general)

22-D. Development of the Electric Furnace Industry During 1949. W. J. Reagan. *Blast Furnace and Steel Plant,* v. 38, Jan. 1950, p. 81-82, 139.

As applied to steelmaking. (D5)

23-D. Arc Furnace Operation and Equipment. A. R. Oltrogge. *Blast Furnace and Steel Plant,* v. 38, Jan. 1950, p. 87-98, 139.

Reviews electrical steel melting and refining with respect to furnace performance. (D5)

24-D. Iron and Steel Plant Refractories. Emil B. Guenther. *Blast Furnace and Steel Plant,* v. 38, Jan. 1950, p. 100-101, 135.

Selection of the above.

(D general)

25-D. Reduction of Sulphur in Iron and Steel; Recent Spanish Results. *Chemical Age,* v. 62, Jan. 7, 1950, p. 20. From paper by A. Gimenez y San-

martin, *DYNA*, v. 24, 1949, p. 117-121.
Study of the Perrin process.
(D2, D5)

26-D. Influence of Certain Production Factors on Properties of Carbonaceous Rammed Masses. (In Russian.) A. A. Pirogov and V. P. Rakina. *Ogneupory* (Refractories), v. 14, Sept. 1949, p. 402-413.
Influences of quality and quantity of binder, quality of coke, fineness of grinding of carbonaceous materials, degree of packing, and preliminary heat treatment on properties of carbonaceous masses for lining blast furnaces. Two types of mass, from coke and from anthracite, were investigated. (D1)

27-D. Manganese Research. Charles H. Herty, Jr. *American Iron and Steel Institute*, "Technical Committee Activities", 1949, p. 202-208.
Uses of Mn in steelmaking and its effects on surface quality and other properties; also its use as a deoxidizer. (D general, Mn)

28-D. Cold Charge Practice in Open Hearth Operations. O. A. Kresse. *American Iron and Steel Institute*, "Technical Committee Activities", 1949, p. 302-306.
Scrap preparation, sulphur control, quality maintenance, and charges for sheet products in steel production. (D2)

29-D. Five Years of Blast Furnace Operation Under Elevated Top Pressure. Frank Janecek. *Iron and Steel Engineer*, v. 27, Jan. 1950, p. 55-61; discussion, p. 61-62.
Further operational experience with pressure blowing of blast furnaces which bears out earlier claims for higher production, greater coke economy, and less flue dust. (D1)

30-D. Inductive Stirring in Arc Furnaces. Sven Fornander and Folke Nilsson. *Journal of Metals*, v. 188, Jan. 1950, p. 22-29; Feb. 1950, p. 256-256D.
A new type of stirring device to accelerate metallurgical reactions in steelmaking arc furnaces. History of inductive stirring, type of equipment used in latest experiments, and results during the melting-down period; power consumption for melting, the oxidizing period, and slag removal. Concluding installment: Factors developed during the reducing period, specific effects on refractory linings, and economic aspects. (D5)

31-D. Effect of Melting Practice on Hydrogen. Sam F. Carter. *Journal of Metals*, v. 188, Jan. 1950, p. 30-40; Feb. 1950, p. 245-255.
A number of quantitative hydrogen analyses of some electric arc-furnace steels with varied melting practices. Causes and effects of hydrogen in steel; procedures used in this investigation; results for carbon steels. 28 ref. (D5, H)

32-D. The Use of Radiocalcium To Study the Distribution of Calcium Between Molten Slags and Iron Saturated With Carbon. W. O. Philbrook, Kenneth M. Goldman, and Martha M. Helzel. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 188, Feb. 1950, p. 361-367.
Radioactive calcium was used to learn whether Ca can be detected in iron saturated with carbon after melting under CaO-Al_2O_3-SiO_2 slags similar to those used in the iron blast furnace. No Ca could be found in the metal under conditions which were favorable for its reduction by calcium, and it was concluded that the Ca content was less than 6×10^{-5} %. Some of the problems encountered indicate certain pitfalls and limitations of tracer methods. 12 ref. (D1, S19, Fe)

33-D. The Solubility of Oxygen in Liquid Iron Containing Aluminum. D. C. Hilty and Walter Crafts. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 188, Feb. 1950, p. 414-424.
Solubility was determined at 1550, 1600, and 1650° C. and found to be much higher than predicted from theoretical considerations, possibly due to equilibria with an Fe-Al spinel phase rather than pure Al_2O_3. The presence of Mn greatly increased the deoxidizing power of Al. 23 ref. (D general)

34-D. Solubility of Oxygen in Liquid Iron Containing Silicon and Manganese. D. C. Hilty and Walter Crafts. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 188, Feb. 1950, p. 425-436.
Determination of the solubility of O_2 in iron containing Si or Mn or both confirmed earlier work on Si, showed that manganese is more effective than expected, and demonstrated that the combination of Si and Mn is a much stronger deoxidizer than might have been inferred from individual effects. 18 ref.
(D general)

35-D. Increasing Open Hearth Production by Use of Oxygen, Better Refractories and Control of Slag. II. and III. Erle G. Hill. *Industrial Heating*, v. 16, Dec. 1949, p. 2222, 2224, 2226, 2228-2229; v, 17, Jan. 1950, p. 128, 130, 133.

Previously abstracted from *American Iron and Steel Institute*, Preprint, 1949. See item 2B-151, 1949. (D2)

36-D. Factors Affecting Steel Quality in the Open Hearth. *Industrial Heating*, v. 17, Jan. 1950, p. 80, 82, 84, 86, 88, 176.

Summarizes several papers presented at National Open Hearth Steel Committee's 32nd annual conference sponsored by AIME. (D2)

37-D. A Contribution to the Problem of Inclusions in Steel. (In Czech.) Vl. Zednik. *Hutnické Listy*, v. 4, Oct. 1949, p. 319-324; Nov. 1949, p. 360-363.

Various methods for quantitative determination. Importance of melting technique, erosive effect of steel on ladle refractories, and character and amount of inclusions. Interesting behavior of steel which was successfully deoxidized by means of calcium silicide. 23 ref. (D general)

38-D. Statistical Study of Ingot Molds. (In French.) P. Rocquet. *Revue de Métallurgie*, v. 46, Nov. 1949, p. 755-757.

Relationship between the composition of the molds and their service life. (D9)

39-D. Study of the Blast in Bessemer Converters by Means of a Volumetric Instrument. (In French.) R. Michaux, P. Leroy, F. Meyers, and F. Renard. *Revue de Métallurgie*, v. 46, Nov. 1949, p. 779-796.

Instrument developed for determination of blast output as a function of total volume of forced air. Method of operation and potentialities for study of blast-furnace operation. (D3)

40-D. Concerning the Reduction of Iron Oxides in the Melt. (In German.) Ernst Justus Kohlmeyer. *Archiv für das Eisenhüttenwesen*, v. 20, Nov.-Dec. 1949, p. 345-347.

Reduction of Fe_2O_3 and its mixtures with other metal oxides by melting them in the carbon crucible. With equal temperatures, rate of reduction depends on heat of formation of the oxides, their melting points, and solubility of the reduced metals in the molten iron. The significance of the unstable Fe-CO complex in the formation of blast-furnace dust and in corrosion of the roof of the openhearth furnace. The process can be used to reduce Al_2O_3 to metallic Al. (D general)

41-D. Dephosphorization of Iron Alloys With Alkali- and Alkaline-Earth Metals, Especially With Magnesium. (In German.) Wilhelm Anton Fischer and Josef Heyer. *Archiv für das Eisenhüttenwesen*, v. 20, Nov.-Dec. 1949, p. 369-374.

Phosphorus was extracted—mostly in the form of gaseous hydrogen phosphide—from iron alloys, ferrophosphorus containing about 22% P, and ferromanganese with 2.6% P and 66% Mn by heating in closed iron crucibles with Mg at different temperatures, followed by washing the reaction product with water. Tests made with 200 times larger charges in a revolving cylindrical furnace under a protective atmosphere of hydrogen confirmed the results. (D general, C general, Mn)

42-D. The British Iron and Steel Industry in 1949. *Engineer*, v. 189, Jan. 13, 1950, p. 61-63; Jan. 20, 1950, p. 74-76.

Steelmaking and primary fabrication developments. (D general)

43-D. Additions for Converter Treatment of a Steel Containing 3% Nickel, 0.8% Chromium, and 0.35% Molybdenum. (In French.) Etienne Sautereau. *Fonderie*, Nov. 1949, p. 1840.

Recommended compositions and methods for introduction of alloying additions. (D3, AY)

44-D. Turbo-Hearth Process Promises Quality Steel in 12 Minutes. C. E. Sims and F. L. Toy. *Steel*, v. 126, Feb. 27, 1950, p. 72, 74, 77. A condensation.

32 heats of new special-process steel were made by surface-blowing 1000-lb. charges of hot basic iron in a basic-lined hearth. Experiments were conducted in a cooperative research project of Carnegie-Illinois Steel Corp. and Battelle Memorial Institute. Openhearth quality steel is made in 12 min. without using external fuel. Basic brick capable of withstanding temperatures over 3000° F. is used to line the hearth chamber. (D2)

45-D. New "Turbo-Hearth" Makes Steel in Twelve Minutes. *Steel Processing*, v. 36, Feb. 1950, p. 79. Based on paper by C. E. Sims and F. L. Toy.

See item 44-D, above. (D2)

46-D. Production of Wrought Iron. Charles R. FonDersmith and Edward B. Story. *Steel*, v. 126, Mar. 6, 1950, p. 92, 94, 96, 99-100, 102.

Development of the wrought iron industry from prehistoric times up to and including today's processes. (D8, Fe)

47-D. Factors Contributing to the Cracking of Medium Carbon Silicon-Killed Steel Ingots. J. A. Warchol. *Blast Furnace and Steel Plant*, v. 38, Feb. 1950, p. 221-222, 224, 253.

Ingots were poured of two steels containing 0.15-0.25% C plus 0.35-0.50% Mn; and 0.25-0.30% C plus 0.70-0.90% Mn. Effects of Mn, S, C, mold and bottom-plate condition, teeming speed, pouring temperature, and rolling-mill practice. (D9, F23, CN)

48-D. Rotary Furnaces for Nodulising the Flue Dust of Blast Furnaces in Luxemburg Steel Works. H. Welter. *Engineers' Digest,* v. 11, Feb. 1950, p. 55. Translated and condensed from *L'Ossature Métallique,* v. 14, Oct. 1949, p. 445-450.

Amount collected is about 160-360 lb. per ton of pig iron. Composition is about that of a good "minette" ore of 36% Fe plus 0.7% Mn and 4-5% coke dust. (D1, Fe)

49-D. Oxygen Speeds Production of Stainless Steels in the Electric Furnace. *Industrial Heating,* v. 17, Feb. 1950, p. 258, 260. Condensed from paper by A. C. Ogan.

Experiences at Duquesne Works of Carnegie-Illinois Steel Corp. (D6, B22, SS)

50-D. Cold Metal Operations and Basic Foundry Practice. *Industrial Heating,* v. 17, Feb. 1950, p. 264, 266, 268, 270, 272, 274, 276, 308.

Reviews 11 papers presented at 32nd annual conference of the National Open Hearth Steel Committee. (D2, ST)

51-D. Construction and Maintenance of Open Hearth Bottoms. *Industrial Heating,* v. 17, Feb. 1950, p. 310, 312-313. Condensed from paper by C. William Conn. (D2, ST)

52-D. High-Speed Camera Registers Physical Reaction of Ironmaking. *Steel,* v. 126, Mar. 13, 1950, p. 119.

Color motion pictures shown at winter meeting of Eastern States Blast Furnace & Coke Oven Assn. Summaries of papers presented. (D1, Fe)

53-D. The Influence of Gas/Solid Temperature Differences on Blast-Furnace Operation. J. Taylor. *Journal of the Iron and Steel Institute,* v. 164, Feb. 1950, p. 129-140.

Effects of major operating variables on gas/solid temperature differences in the stock column of the blast-furnace were calculated, and used in consideration of the extent to which the high-temperature heat requirement, as against total heat requirement, is an overriding factor in carbon efficiency. It is concluded that, only for low slag volumes, low blast temperatures, and high hearth temperatures, is this probably the case for modern furnaces. The general effect of the operating variables on vertical temperature gradient in the stock column is deduced from the temperature differences. 12 ref. (D1, ST)

54-D. Proposals for the Modification of a Blast-Furnace Top to Give Controlled Burden Distribution. E. L. Diamond. *Journal of the Iron and Steel Institute,* v. 164, Feb. 1950, p. 173-180.

Practical engineering design for modifying an existing blast furnace to give control of stockline segregation by the method of using a moving frustum below the big bell. An alternative design, using a fixed frustum, is also presented, which gives nearly as wide a range of control by a somewhat simpler method. Experimental results for each design. (D1, Fe)

55-D. A Large Vacuum Valve and Its Application to an Electric Furnace. W. F. Atkins and G. C. H. Jenkins. *Engineering,* v. 169, Feb. 3, 1950, p. 132. A condensation.

A process has been developed for production of high purity iron on a 25-lb. scale, the last operation consisting of deoxidation of molten iron by hydrogen in a high-frequency furnace installed in a large vacuum-tight tank. Describes and diagrams valve used in connection with this equipment. (D8, Fe)

56-D. American Practice in the Acid Electric Steelmaking Furnace; Special Techniques Increase Output. A. C. Brearley. *Metal Treatment and Drop Forging,* v. 16, Winter 1949-50, p. 253-254, 256, 258.

British author feels that, given the right type of scrap, the process could be adopted with advantage more widely in Britain. (D5, ST)

57-D. Refractories Research in the Open-Hearth Steel Industry. *Engineer,* v. 189, Feb. 10, 1950, p. 168-170.

Survey with emphasis on the work of the British Iron and Steel Research Association. (D2, ST)

58-D. Influence of Moisture Content in the Blast on the Quality of Rails Made From Basic Bessemer Steels. (In French.) I. Godefroy. *Revue de Métallurgie,* v. 46, Dec. 1949, p. 869-871.

Thorough experimental investigation failed to establish a relation between moisture content in the blast and cracks appearing during service. (D3, CN)

59-D. Development and Possibilities of Improving the Thermal Economy of Steel Works. (In German.) Fritz Wese-

mann. *Stahl und Eisen,* v. 70, Jan. 5, 1950, p. 1-10.

A critical study of the relationships between the specific heat consumption of three steel mills and their productive efficiency. (D general, ST)

60-D. Refining High-Chromium Melts in the Electric Arc Furnace With Pure Oxygen. (In German.) Rudolf Fischer. *Stahl und Eisen,* v. 70, Jan. 5, 1950, p. 10-19; discussion, p. 19-21.

Practicability of process was determined by a series of experiments. The high wear of the furnace lining and the cost of the oxygen are favorably counterbalanced by the reduced loss of alloying elements. Experiments were also made with high-Si and high-Mn chromium scrap. 19 ref. (D5, B22, AY)

61-D. Chemical Reactions in the Blast Furnace. (In German.) Nils Sjögren. *Mitteilungen des Chemischen Forschungsinstitutes der Industrie Österreichs,* v. 3, Dec. 1949, p. 105-109.

Chemical reactions in the ferrous blast furnace, also compositions and effects of slags, and utilization of slag in various industries. (D1)

62-D. Experimental Operation of a Basic-Lined Surface-Blown Hearth for Steel Production. C. E. Sims and F. L. Toy. *Blast Furnace and Steel Plant,* v. 38, Mar. 1950, p. 311-313, 321. A condensation.

See abstract of "Turbo-Hearth Process Promises Quality Steel in 12 Minutes", *Steel,* item 44-D, 1950. (D2, ST)

63-D. Desulphurizing for the Bessemer Process. E. P. Best. *Blast Furnace and Steel Plant,* v. 38, Mar. 1950, p. 314-321.

Development of patented process in which as much as 92% of the S is eliminated by ladle treatment with NaOH prior to bessemerizing. Process was developed by A. M. Byers Co. to make it possible to shift from hand puddling to the Byers process for manufacture of wrought iron. Important implications for the iron and steel industry. (D3, D8, Fe)

64-D. Pig-Casting Machine Practice at Woodward. H. A. Byrns. *Journal of Metals,* v. 188, Mar. 1950, p. 474-475.

Procedure and handling methods used by the Woodward Iron Co. (D1, Fe)

65-D. Pig Machine Practice at Hanna. A. J. Macdonald. *Journal of Metals,* v. 188, Mar. 1950, p. 476-476A.

Equipment and procedure used to produce pig iron at Hanna Furnace Corp. (D1, Fe)

66-D. Lessons From a Hanging Blast Furnace. L. M. Fulton. *Journal of Metals,* v. 188, Mar. 1950, p. 476E-480.

Behavior of a furnace which frequently encountered hanging (when downward movement of stack either ceases or slows down enough to delay charging beyond the proper time). Cause of hanging and changes in furnace design. (D1, ST)

67-D. Iron Without the Blast Furnace. Sven Eketorp. *Canadian Metals,* v. 13, Feb. 1950, p. 6-9, 48.

Sponge-iron research and commercial application. 11 ref. (D8, Fe)

68-D. Open-Hearth Furnace; Practical Aspects of Recent Developments in Design and Operation. A. H. Leckie. *Iron and Steel,* v. 23, Mar. 1950, p. 93-98.

See abstract from *Engineering,* item 10-D, 1950. (D2)

69-D. Application and Use of Automatic Controls for Open-Hearth Furnaces. E. Whitehead. *Steel,* v. 126, Mar. 27, 1950, p. 76, 78, 80, 87, 90, 92.

See abstract from *Journal of the Iron and Steel Institute,* item 11-319, 1949. (D2, ST)

70-D. Open-Hearth Steelmakers Stress Control of Bath Temperature. *Steel,* v. 126, Mar. 27, 1950, p. 84, 87.

Summarizes proceedings of Chicago section meeting of National Open Hearth Steel Committee, AIME, Mar. 8, 1950. (D2, ST)

71-D. Increased Open Hearth Production by Improved Charging Methods. R. Tietig. *Iron and Steel Engineer,* v. 27, Mar. 1950, p. 64-72; discussion, p. 72-77.

Modernized equipment. (D2, ST)

72-D. Checker Brick Design, Construction and Use. Jay J. Seaver. *Iron and Steel Engineer,* v. 27, Mar. 1950, p. 94-98.

Experience with checker work in blast-furnace stoves indicates that openhearth checker brick should not be thicker than 2½ in. (D1)

73-D. Experimental Operation of a Basic-Lined Surface-Blown Hearth for Steel Production. C. E. Sims and F. L. Toy. *Iron and Steel Engineer,* v. 27, Mar. 1950, p. 116, 118, 120. A condensation.

See abstract of "Turbo-Hearth Process Promises Quality Steel in 12 Minutes", *Steel,* item 44-D, 1950. (D3, Fe)

74-D. Some Notes on Heating Problems in Steel Works. (In Swedish.) P. Löfström. *Jernkontorets Annaler,* v. 134, no. 1, 1950, p. 24-40.

Thermal efficiencies and sources of

loss in steelmaking and rolling. Recommended improvements in furnace construction and operation to minimize such losses.
(D general, F21, ST)

75-D. The Perrin Process. (In Swedish.) R. Perrin. *Jernkontorets Annaler,* v. 134, no. 1, 1950, p. 1-23.
Details of process for deoxidation and desulfurization of steel. Advantages in combination with various steelmaking processes. Application to steelmaking with pure raw materials. (D general, ST)

76-D. Use of Adirondack Sinter in Blast Furnaces. Emer H. Riddle. *Journal of Metals,* v. 188, Apr. 1950, p. 641-645.
Data on blast-furnace results obtained from concentrated Adirondack magnetite produced by Jones & Laughlin. (D1, Fe)

77-D. Blowing Out Carbon-Hearth Furnaces. George D. Sells and H. P. Saxer. *Journal of Metals,* v. 188, Apr. 1950, p. 646-647.
Separate articles describe experiences of Pittsburgh Steel Co., and Jones & Laughlin Steel Corp.
(D1, Fe)

78-D. Conditions of Outstanding Blast Furnace Operation. Kurt Neustaetter. *Journal of Metals,* v. 188, Apr. 1950, p. 651-655.
Various cases of top production of blast furnaces were compared. Only one favorable condition (such as low slag volume, good structure of ore or coke, or high top pressure) will not result in record production. A number of favorable factors combined with absence of unfavorable factors is necessary to achieve best results. 10 ref. (D1, Fe)

79-D. Application of Superimposed Precipitators. R. E. Touzalin. *Journal of Metals,* v. 188, Apr. 1950, p. 656-660.
Installation of McKee equipment, for the fine cleaning of blast-furnace gas in a tower scrubber and electrostatic precipitator combination. (D1, Fe)

80-D. Experimental Operation of a Basic-Lined Surface-Blown Hearth for Steel Production. C. E. Sims and F. L. Toy. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Apr. 1950, p. 694-708.
A series of 1000-lb. experimental heats of regular basic pig iron was surface blown with air jets on a basic hearth using burned lime to produce a basic slag. After a processing period of about 12 min., depending on rate of air delivered, steels were produced with an average composition of 0.03% C, 0.08% Mn, less than 0.01% Si, 0.024% P, 0.021% S, and 0.003% N. Temperature was increased 300° F. by the heat of reaction. (See abstract of condensed version in *Steel,* item 44-D, 1950.)
(D3, ST)

81-D. Operations of a Basic-Lined Surface-Blown Hearth for Steel Production. C. E. Sims and F. L. Toy. *Industrial Heating,* v. 17, Mar. 1950, p. 450-452, 454, 456. A condensation.
See abstract of "Turbo-Hearth Process Promises Quality Steel in 12 Minutes", *Steel,* item 44-D, 1950.
(D3, ST)

82-D. Evaluating Resistance of Refractories to Carbon Monoxide Disintegration. J. A. Shea. *Industrial Heating,* v. 17, Mar. 1950, p. 500, 502.
See abstract of "Blast Furnace Brick Disintegration Test Equipment and Test Procedure", *American Ceramic Society Bulletin.* See item 17-76, 1949. (D1, B19, Fe)

83-D. Chemical Changes in Basic Brick During Service. T. F. Berry, W. C. Allen, and R. B. Snow. *Journal of the American Ceramic Society,* v. 33, Apr. 1, 1950, p. 121-132.
See abstract of condensed version from *Industrial Heating,* item 17-74, 1949. (D2)

84-D. Apparatus for Preparation of Metals With an Exactly Known Content of Impurities. J. D. Fast. *Philips Technical Review,* v. 11, Feb. 1950, p. 241-244.
See abstract of "An Apparatus for Preparing Small Samples of Pure Iron to Which Fixed Quantities of Impurities Can Be Added", *Philips Research Reports,* item 11-380, 1949. (D8, Fe)

85-D. Design of a Large Vacuum Valve; Its Application to an Electric Furnace. W. F. Atkins and G. C. H. Jenkins. *Metallurgia,* v. 41, Mar. 1950, p. 266-267; *Machinery* (London), v. 76, Mar. 9, 1950, p. 351-352.
See abstract from *Engineering,* item 55-D, 1950. (D8, Fe)

86-D. Application of Oxygen in Metallurgy. Present Status and Future Possibilities. (In French.) G. Husson. *Revue de Métallurgie,* v. 47, Jan. 1950, p. 88-91.
Methods, unsolved problems, applications, and future prospects. Restricted to ferrous practice.
(B22, Fe)

87-D. Use of a Stream of Gas for Desulfurization of Granules of Iron Produced by the Krupp Direct Reduction Process. (In French.) F. Kakiuchi and Z. Yamamoto. *Circulaire d'Infor-*

mations Techniques, v. 6, Aug.-Sept.-Oct. 1949, p. 367-379. Translated from *Tetsu to Hagane* (Japanese), v. 28, Dec. 1942, p. 1273-1281.

Laboratory experiments on the above, using hydrogen. After 5 hr., 80% of the carbon and 45% of the phosphorus were eliminated. Coke-oven gas may be used after preliminary removal of part of the methane and inorganic sulfur compounds. (D8, Fe)

88-D. Improving Blast Furnace Practice. P. E. Cavanagh. *Metal Progress,* v. 57, Apr. 1950, p. 463-467.

The thesis is advanced that evolution of the iron blast furnace has reduced man-hours of labor to a minimum. It is therefore believed that future progress will be toward increasing smelting efficiency without disturbing labor efficiency. Present efforts along this line and their practical limitations. (D1, Fe)

89-D. Blast-Furnace Gas Cleaning; Methods for Calculating the Motions of Particles in a Gas. J. Stringer. *Journal of the Iron and Steel Institute,* v. 164, Mar. 1950, p. 294-304.

Curves and nomograms by means of which measurements of particle free-falling speeds may be extrapolated to give the terminal velocity under conditions existing within the plant. Method is said to give more accurate results than those obtained by applying Stokes' law and extrapolating far beyond its limit of validity. (D1, ST)

90-D. Blast-Furnace Gas Cleaning; An Analysis of Plant Performance. R. F. Jennings. *Journal of the Iron and Steel Institute,* v. 164, Mar. 1950, p. 305-325.

Principles of operation and possible ways of improving separating power and mechanical efficiency. 17 ref. (D1, ST)

91-D. Kinetics of Reduction of Ferric Oxides. (In Russian.) O. A. Esin and P. V. Gel'd. *Uspekhi Khimii* (Progress in Chemistry), v. 18, Nov.-Dec. 1949, p. 658-681.

Theoretical and experimental viewpoints, as applied to blast-furnace reduction of iron ore. Practical factors such as size of ore lumps and their porosity, pressure, composition, and temperature of gas, etc. 87 ref. (D1, Fe)

92-D. Operating Properties of Crown Dinas Brick (Physicochemical Processes Causing Fusion of Dinas in Open-hearth Roofs). (In Russian.) I. S. Kainarskii and V. D. Tsigler. *Ogneupory* (Refractories), v. 14, Dec. 1949, p. 532-538.

Information submitted by various steel works shows that good fusion is dependent on the presence of large amounts of the tridymite form of silica, rather than quartz and crystobalite. Introduction of additions increasing the tendency of Dinas brick to transform into tridymite results in higher fusibility. (D2)

93-D. Refractory Practice in Acid Electric Steel Melting. R. H. Jacoby and M. Petty. *American Foundryman,* v. 17, Apr. 1950, p. 117-121.

Established practices in electric-furnace shell lining and roof construction, ladle lining, and refractory repair and storage. (D5, ST)

94-D. The Bessemer Converter Process in the Manufacture of Steel. A. B. Wilder. *Industrial Heating,* v. 17. Apr. 1950, p. 634, 636, 638, 640, 642, 644.

See abstract under similar title from *Journal of Metals* (Technical Section), items 2B-339, 1949. (D3, ST)

95-D. Acid Open Hearth Furnace Operations. *Industrial Heating,* v. 17, Apr. 1950, p. 646, 648, 650, 652.

Summarizes 5 papers presented at the Acid Open Hearth Operations Session of 32nd annual conference of the National Open Hearth Steel Committee of the AIME in Chicago. (D2, ST)

96-D. Openhearth and Blast Furnace Operators Report Latest Developments. *Iron Age,* v. 165, Apr. 27, 1950, p. 84-87.

Summarizes proceedings of 33rd joint conference of the National Open Hearth Steel Committee and the Blast Furnace, Coke Oven, and Raw Material Committee, AIME, Cincinnati, Apr. 10-13. Oxygen-jet-fired openhearths, new mold coatings, furnace practice, utilization of low-grade ore, and coke-oven maintenance were featured. (D1, D2, Fe, ST)

97-D. Graphited Steel Ladle Stopper and Nozzle Refractories. *Ceramic Age,* v. 55, Apr. 1950, p. 260-261. Translated and condensed from "The Behavior of Graphite and Carbon in Refractory Materials," by F. Harders and H. Grewe.

Previously abstracted from *Stahl und Eisen.* See item 17-84, 1949. (D9, B19, ST)

98-D. Scrap Charging: Key to Increased Open-Hearth Production. R. Russell Fayles. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 24-34.

Quality of foreign and home scrap, size of charging boxes, and scrapyard facilities. (D2, A8, ST)

99-D. Effect of High Coke-Oven Gas Firing on Open-Hearth Operation. Fred G. Jaicks. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 35-41.

Previously abstracted from *Blast Furnace and Steel Plant.* See item 16B-78, 1949. (D2, ST)

100-D. Desulphurization of Pig Iron. H. M. Griffith. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 43-45; discussion, p. 43, 46.

Procedure used by the Steel Co. of Canada. (D2, CI)

101-D. Desulphurizing Cupola-Melted Hot Metal by Ladle Treatment With Alkalis. E. P. Best. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 46-53; discussion, p. 53-55.

Previously abstracted from "Desulphurizing for the Bessemer Process", *Blast Furnace and Steel Plant.* See item 63-D, 1950. (D3, D8, Fe)

102-D. Sulphur in Basic Iron and Steel. H. E. Warren, Jr. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 55-61; discussion, p. 61-65.

Previously abstracted from *Journal of Metals.* See item 2B-229, 1949. (D1, D2, ST)

103-D. Effect of Charging Variables and Additions on Sulphur Elimination. A. H. Osborne, *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 66-70.

Study made at Armco on a single furnace during the period of one campaign from roof to roof, to determine variables that effect quantity of S in the furnace and efficiency of removal during the refining period. Data were collected on 130 heats covering details of charge, delays, analysis, and furnace operation. (D2, ST))

104-D. Use of Manganese Ore for Sulphur Removal. W. H. Carpenter. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 71-72.

Study made at the Pueblo plant of the Colorado Fuel and Iron Corp. (D2, ST)

105-D. Sulphur Balance in Open-Hearth Heats. Philip Schane, Jr. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 72-74; discussion, p. 74.

Contribution of S from various materials used at three plants of Carnegie-Illinois Steel Corp. D2, ST)

106-D. Reports by Sections on Use of Oxygen and Compressed Air. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 75-85; discussion, p. 85-87.

Reports from Eastern Section (J. S. Marsh); Southwestern Section (E. H. Reyer); Chicago Section (G. C. Lawton); Northern Ohio Section (T. A. Cleary); Southern Ohio Section (Robert S. Bower); Pittsburgh District (A. W. Thornton); and Western Section (George B. McMeans.) (D2, B22, ST)

107-D. Factors Affecting Open-Hearth Production in a Gas-Fired Furnace. S. F. Elam. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 87-92; discussion, p. 102-103.

Charging variables, slag control, time variables, working heats, and fuel rate. Data from Ashland and Middletown shops of Armco Steel Corp. are compared. (D2, ST)

108-D. Evaluation of Factors Influencing Open-Hearth Furnace Production in Oil-Fired Furnaces. A. P. Woods. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 93-101; discussion, p. 102-103.

Charging variables, flush, time variables, working the heat, and fuel rate. (D2, ST)

109-D. Sampling of Oxygen in Waste Gases. G. C. Primm. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 104-106.

Data obtained from questionnaire. Frequency and accuracy of sampling and equipment and procedure used. Relation of volume of air metered to that required. (D2, S11)

110-D. What Is Being Done To Improve Scrap Quality and Better Prepare It for Charging? H. A. Parker. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 107-109.

Survey based upon answers to questionnaires from 51 openhearth shops in 39 plants. 36 charged hot metal; 13, cold iron; and 2, blown metal. (D2, A8, ST)

111-D. Use of Blown Metal in Stationary Furnaces. S. J. Dougherty. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 110-115.

Procedure used by Weirton Steel Co. An increase in production of over 40% is realized by substituting partially blown metal for part of scrap and hot metal. (D7, ST)

112-D. Use of Blown Metal in Tilting Open-Hearth Furnaces. S. J. Creswell. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 116-120.

Dry-bottom practice. The charge is limestone. 270 000 lb. blown metal, and 40,000 hot metal. Working the heat; the slag; advantages and disadvantages of process. (D7, ST)

113-D. A Progress Report on Hot-Top Research. J. W. Mueller. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 120-126.

Hot top made of clay and various combustible materials is porous, insulating, and light in weight. Use of 10% volume hot tops on ingots up to 18½ sq. in., compared with 21% volume tops normally used. (D9, ST)

114-D. Recent Developments in Hot-Top Designs; Relative Efficiencies. E. W. Pierce. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 127-129.

Use of insulated clay, restricted C & D, experimental clay, and cement hot tops, on the basis of experience at South Works of Carnegie-Illinois Steel Corp. (D9, ST)

115-D. Scrap Preparation and Charging Practice. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 130-142.

Consists of the following papers: "Scrap Preparation and Charging Practice: Keystone Practice", William Schwinn (p. 130-134; discussion, p. 134-135); "Preparation and Charging Scrap at Sheffield Steel Corporation", W. H. Steinheider (p. 135-136; discussion, p. 136); "Scrap Preparation and Charging Practice at Granite City", R. C. Solomon (p. 137-139); "Scrap Preparation and Charging by Armco Steel Corporation", H. M. Parker (p. 139-140); and "Charging Practice at Continental Steel Corporation", John F. Richardson (p. 141-142). (D2, A8, ST)

116-D. Furnace Design for Cold-Metal Shops. Oliver P. Luetscher. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 142-147; discussion, p. 147-149.

Requirements of furnace for melting high-scrap charges which include large doors, a high roof, and exceptionally sharp working. (D2, ST)

117-D. Use of Metallurgical Oxygen at American Steel Foundries. L. L. Whitney. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 150-155.

Reviews experiences. Use with fuel oil to melt scrap and to remove carbon. (D2, B22, ST)

118-D. Use of Oxygen at Keystone. E. H. Reyer. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 156-158.

Use by injection and as an agent in combustion of fuels in scrap meltdown. Advantages and disadvantages. (D2, B22, ST)

119-D. Multiple-Burner Firing for Open-Hearth Furnaces. R. R. Fayles. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 158-160; discussion, p. 160-161.

Experiments with various designs and operations in Lukens Steel Co. openhearth shops. Results, to date, have been erratic and no definite conclusions as to their value have been reached. (D2, ST)

120-D. The All-Basic Furnace in Canada. A. K. Moore. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 177-178.

Productive and economic data on furnace at the Steel Co. of Canada. (D2, ST)

121-D. The All-Basic Furnace at South Works. M. F. Yarotsky. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 179-181.

Production, operating delays, fuel economy, metallurgical features of quality, and over-all economy of the product manufactured at South Works, Carnegie-Illinois Steel Corp. (D2, ST)

122-D. Basic Ends, Homestead Open Hearth. H. E. Warren Jr. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 182-188; discussion, p. 188-189.

Construction of No. 53 furnace, Homestead Works, Carnegie-Illinois Steel Corp. Relative merits of basic ends. (D2, ST)

123-D. Armco Basic-End Furnaces, Middletown. E. R. Westfall. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 190-191; discussion, p. 191-194.

Compares net cost of repairs per net ton on a campaign basis for basic-end and silica-end construction. (D2, ST)

124-D. Use of Sillimanite for Lining a Hot-Metal Mixer. A. Maupin. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 194-203; discussion, p. 203-205.

Service tests and results. Profitable use depends upon mixer design and operation. (D2, ST)

125-D. Rammed Lining for Metal Mixer. F. A. Colledge. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 205-209; discussion, p. 209-210.

Use of plastic super-duty fireclay ramming mix for patching was found to have definite limitations, particularly as to size of patching job. (D2, ST)

126-D. Deoxidation Vs. Surface Quality. L. R. Silliman and H. J. Forsyth. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 218-221; discussion, 221-224.

Concerned with hot-topped coarse-grained steels. (D2, ST)

127-D. Deoxidation Practice for Semikilled, Capped and Rimmed Steels. S. Feigenbaum. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 225-227; discussion, p. 227-230.

(D2, ST)

128-D. The Problem of Foaming in the Open-Hearth Bath. B. M. Larsen. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 231-233; discussion, p. 233-241.

Theory of foaming and questions for possible experimental consideration. (D2, ST)

129-D. Advantages and Disadvantages of Mechanically Capped Ingots. Oscar Pearson. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 249-253.

Compared with rimmed steel, with special emphasis on ingot structure, surface quality, yield and physical characteristics. (D9, ST)

130-D. Advantages and Disadvantages of Mechanically Capped Ingots. G. M. Yocom. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 253-255.

Capped ingots made by Wheeling Steel Corp., compare with rimmed steel. (D9, ST)

131-D. Factors Affecting Surface Quality of Capped Steel. L. Van Ormer. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 255-256; discussion, p. 256.

(D9, ST)

132-D. Time Interval Between Last Oxygen Pipe and Tap. C. G. McCabe. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 257-258; discussion, p. 258-259.

Results of questionnaire to obtain various operators' opinions. Most plants reported no restrictions. (D2, ST)

133-D. Effect of Nitrogen In Improving Physical Properties of Low-Carbon Steel. S. C. Faddis. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 260-263; discussion, p. 263.

Nitrogen in low-carbon rimmed, semikilled, and capped steels improves tensile strength, yield point, hardness, stiffness, and resistance to fluting in hot-rolled or cold-rolled strip-mill products. However, improvement depends upon effectiveness of N_2 control in steelmaking processes. (D2, Q general, ST)

134-D. A Study of Factors Affecting Surface Quality of Various Steel Products. L. R. Walker. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 278-284.

Previously abstracted from *Industrial Heating*. See item 2B-217, 1949. (D9, F21, ST)

135-D. Late Ore Additions Not Detrimental to Surface Conditions of Castings. F. H. Allison, Jr. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 295-299; discussion, p. 299-304.

Ten heats with ore additions made within 21-32 min. before tapping were compared to 10 with additions at least 50 min. before tapping. Short or long refining times and early or late ore additions (21 min. before tap) have no effect on large acid open-hearth castings poured in dry sand molds. (D2, B22, ST)

136-D. Foaming in Acid Open-Hearth Ladle Slags Has No Connection With the Gas Content of the Metal. T. J. Ondocsin. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 304-305; discussion, p. 305-306.

Attempts to prove the above from observation. (D2, ST)

137-D. Either a High Rate of Carbon Drop or Melting in on a Boil Close to Go-Ahead Analysis Produces the Best Physical Properties. G. S. Baldwin. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers*, v. 32, 1949, p. 306-308; discussion, p. 308-310. (D2, ST)

138-D. Electric Smelting of Iron Ores for Production of Alloy Ores and Steel and Recovery of Chromium and Vanadium. William Bleloch. *Journal of the Chemical Metallurgical & Mining Society of South Africa*, v. 50, Jan. 1950, p. 176-179.

Replies to discussion of his paper (Mar. 1949 issue; see item 2B-196, 1949). (D8, Fe, Cr, V)

139-D. Concentration Changes Resulting From Holding Basic Steel in the Converter After Termination of the Refining Process. (In German.) Werner Geller. *Stahl und Eisen*, v. 70, Feb. 16, 1950, p. 145-146.

Experiments with seven basic steels in a 20-ton converter showed that holding for 10-30 min. did not affect its composition, with the exception of a slight change in phosphorus content. (D3, ST)

140-D. Temperature Measurements of Molten Pig Iron for the Basic Bessemer Converter. (In German.) Theo Kootz. *Stahl und Eisen*, v. 70, Mar. 2, 1950, p. 186-191; discussion, p. 191-192.

How the temperature of blast-furnace pig iron affects the quality of basic converter steel. Causes of errors in temperature measurements; it is shown that the true temperature of the pig iron is that of the optical pyrometer plus 80° C. for bright pig iron, or plus 55° C. if covered with an oxide film. Effect of heat loss in the ladle. (D1, D3, S16, ST)

141-D. Evaluation of the Bessemer Process in the Small Converter. (In German.) Erich Lanzendorfer. *Neue Giesserei*, v. 37 (new ser., v. 3), Feb. 23, 1950, p. 65-72.

The different types of bessemer steel production, and raw-material costs of different charges. How Si content required can be determined by examination of fractured test specimens. Diagrams show converters of 1.5-3.0 tons capacity; photographs show how the melting process can be evaluated by the height of the flame and by appearance of the showers of sparks from the converter mouth. Patented process in which it is claimed that re-use of the converter slag reduces melting loss to 4%. Causes of converter explosions and effect of temperature on the loss of Si and C. (D3, ST)

142-D. Silicon Monoxide Produced During Smelting of Acid Steel. (In Russian.) P. V. Gel'd, A. I. Kholadov, and N. N. Buinov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Feb. 1, 1950, p. 679-682.

Intermediate products liberated during reduction of Si in electric smelting of steel and a series of ferrous alloys were thoroughly investigated. Includes electron micrographs of substances deposited on a sheet of polished steel. (D5, M21, ST)

143-D. The Practice of Bottom Pouring Steel. Part I. Charles R. Funk. *Blast Furnace and Steel Plant*, v. 38,

May 1950, p. 515-520.

Advantages include the use of long molds, longer mold life, cleaner ingot surface, larger ingot yields, and cleaner steel. Disadvantages are also outlined. (D9, ST)

144-D. Effect of Hot Metal on Open Hearth Production. William A. Greene. *Blast Furnace and Steel Plant,* v. 38, May 1950, p. 521-528.

Economic and technological factors in connection with the percentage Mn, Si, P, and S in the hot-metal charge from the blast furnace. Quantitative data are charted. (D2, ST)

145-D. Effect of Iron Quality on Bessemer Blowing Problems. R. E. Edwards. *Journal of Metals,* v. 188, May 1950, p. 736-743.

Comprehensive discussion illustrated by experimental data. (D3, ST)

146-D. Faster Open Hearth Charging. Vernon W. Jones. *Journal of Metals,* v. 188, May 1950, p. 744-745.

Improved methods and equipment used by Armco Steel Corp. (D2, ST)

147-D. Modern Blast Furnace Gas Cleaning Practices. G. P. Burks.*Journal of Metals,* v. 188, May 1950, p. 746-750.

Equipment and procedures of Gary Works, Carnegie-Illinois Steel Corp. (D1, Fe)

148-D. Blowing Out Carbon Hearth Furnaces. W. R. Zehner; C. P. Johnson. *Journal of Metals,* v. 188, May 1950, p. 751-753.

Companion articles describe practice of Bethlehem Steel and Interlake Iron Corp., respectively. (D1, Fe)

149-D. Performance of High Magnesia Ramming Mixes. Rudolph Smith. *Journal of Metals,* v. 188, May 1950, p. 754.

Experiences of Colorado Fuel & Iron Corp. in use of above for open-hearth bottoms. (D2, ST)

150-D. Side-Blow Converter Process for the Production of Low Nitrogen Steel Ingots. R. R. Webster and H. T. Clark. *Journal of Metals,* v. 188, May 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 778-790.

Investigated as a possible commercial process. Two converters of 3-ton and 22-ton capacity were operated on a pilot-plant basis for a total of 214 heats. The steel made was low in nitrogen and possessed good cold working properties. Some problems of converter operation remain to be solved. 10 ref. (D3, ST)

151-D. Manganese Recovery in Acid Electric Steelmaking. Sam F. Carter. *American Foundrymen's Society,* Preprint No. 50-5, 1950, 20 pages.

Concurrent metal and slag analysis before and after Mn addition is correlated. Slag composition, desired metal analysis, temperature, time, slag fluidity, quantity of slag, and ladle additions. Effects of additives and of oxygen. 10 ref. (D5, ST)

152-D. Effect of Coke Stability on Operation of Blast Furnaces. James F. Peters. *Proceedings Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 8, 1949, p. 7-25; discussion, p. 25-31.

Coke plant, screening system, and stability tests at Inland Steel Co.'s pig-iron plant. Correlates stability with amount of breeze screened from coke, and in turn correlates these data with blast-furnace operation. (D1, CI)

153-D. Distinctions Between Large and Small Blast Furnaces at the Inland Steel Company. T. F. Plimpton. *Proceedings Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 8, 1949, p. 101-107; discussion, p. 122-131.

Differences in performance, economy, ease of control, etc. Data are given for the eight Inland furnaces. It was concluded that still larger furnaces might give additional savings. (D1, ST)

154-D. Some Aspects of Operation of Large and Small Blast Furnaces. G. P. Burks. *Proceedings Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 8, 1949, p. 107-115; discussion, p. 122-131.

Reviews size trend in U. S. and compares furnaces of Carnegie-Illinois Steel Corp., Gary, Ind. Effect of quality of raw material, coke rate, and uniformity of product. (D1, ST)

155-D. Operating Data on Small Furnaces Versus Large Furnaces. J. Knox Dye. *Proceedings Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 8, 1949, p. 116-120; discussion, p. 122-131.

Compares three furnaces of Armco Steel Corp., Ashland, Ky., all using the same coke. (D1, ST)

156-D. Operating Data on Small and Large Blast Furnaces. C. F. Hoffman. *Proceedings Blast Furnace, Coke*

Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, v. 8, 1949, p. 121-122; discussion, p. 122-131.

Compares operations of furnaces at the Sparrows Point plant of Bethlehem Steel Co., for one month. They used the same ore, same coke, and same stone, and other factors were comparable. (D1, ST)

157-D. Use of Oxygen and Steam Blast in the Small Converter. (In German.) Hans Kosmider and Paul E. Hardt. *Stahl und Eisen,* v. 70, Apr. 13, 1950, p. 303-320; discussion, p. 320-321.

Experimental work on use of the above in a 2-ton converter. Effects of various blast, slag, and metal-composition factors on quality of the product. Improved arrangement for blowing consisting of a series of copper tubes, imbedded in a dolomite-tar mass. 95 ref. (D3, ST)

158-D. Refining Basic Steel With Superheated Steam or Oxygen. (In German.) Wilhelm vor dem Esche. *Stahl und Eisen,* v. 70, Apr. 13, 1950, p. 322-326.

Experiments with a 40-ton converter showed that the steam process permits production of steel with a N content of 0.005-0.009% and increases the probability of attaining the desired steel composition. Effect of impurities on resistance of the steel to aging was also studied. (D3, ST)

159-D. The Thermal Economy of the Basic Converter in the Refining of Pig Iron With Gases Other Than Air. (In German.) Ernst Karwat. *Stahl und Eisen,* v. 70, Apr. 13, 1950, p. 326-330.

Thermal equations for refining of pig iron with O_2, CO_2, H_2O, and mixtures of these gases; compares their respective thermal efficiencies. Data are tabulated. (D3, ST)

160-D. (Book) **Proceedings of the 32nd Conference, National Open Hearth Committee of the Iron and Steel Divisions, American Institute of Mining and Metallurgical Engineers,** v. 32, 1949, 327 pages. The Institute, 29 West 39th St., New York 18, N. Y. $10.00 ($7.50 to members).

Papers presented at conference, including general remarks and reports. Twenty-two papers are on basic openhearth; 11 papers on cold-metal operations and basic foundry practice; 10 papers on refractories and masonry; 3 on metallurgy of the openhearth process; 8 on quality; and 5 on acid openhearth operations. Individual papers are abstracted separately.

161-D. (Book) **Proceedings, Blast Furnace, Coke Oven and Raw Materials Committee** (vol. 8, 1949). 235 pages. 1950. Iron and Steel Div., American Institute of Mining and Metallurgical Engineers, 29 West 39th St., New York 18, N. Y. $10.00 ($7.00 to members).

Covers Chicago meeting of Apr. 18-20, 1949. Papers deal with blast-furnace and coke-oven practice, sintering and nodulizing of iron ores, and iron-ore mining and blending. (Selected papers are abstracted separately.) (D1, B general, Fe)

162-D. Alternative Iron Smelting Processes. P. E. Cavanagh. *Metal Progress,* v. 57, May 1950, p. 631-636.

Based on a study by Ontario Research Foundation of some 150 processes for producing iron from ores. Detailed studies were confined to commercially proven processes. Large and small blast furnaces, electric smelting, and the sponge-iron process. Cost analyses based on Canadian conditions in 1948. Map of Canada shows locations where alternative processes have best chance of success. (D1, D8, Fe)

163-D. Steel Development Builds Industrial Basis. R. M. Dyke. *Western Miner,* v. 23, May 1950, p. 40-42.

Production of electric-furnace steel from scrap in British Columbia. Also includes rolling and forming operations. (D5, F22, ST)

164-D. First Report of the Ingot Surface Defects Sub-Committee. *Journal of the Iron and Steel Institute,* v. 165, May 1950, p. 41-66.

Occurrence of the principal types of ingot surface defect—cracks, blow-holes, and shelliness—in the three main classes of steel-killed, balanced and effervescing. Part I: The causes and control methods for various defects. Part II: Plant-scale experiments and definite recommendations based on the results. 14 ref. (D9, ST)

165-D. Thermodynamic Aspects of the Movement of Sulphur Between Gas and Slag in the Basic Open-Hearth Process. F. D. Richardson and G. Withers. *Journal of the Iron and Steel Institute,* v. 165, May 1950, p. 66-71.

A theoretical study was made of the sulfur equilibrium between a basic slag containing sulfur and the furnace gases in the openhearth process. Concludes that the higher the slag temperature, and the more complete the degree of combustion of the gases coming into contact with the slag surface, the less

chance there is of the slag picking up sulfur from the gas phase. Combustion limits required at the slag surface in the presence of gases of various sulfur contents, to avoid pick-up in the refining period, are calculated. 11 ref. (D2, B21, ST)

166-D. Studies in the Deoxidation of Iron; Deoxidation by Aluminum. H. A. Sloman and E. L. Evans. *Journal of the Iron and Steel Institute,* v. 165, May 1950, p. 81-90.

The preparation, microscopical examination, and analysis of a series of 19 ingots made by adding quantities of iron oxide and Al to 300-500 g. melts of pure iron, in vacuo. Results reported include total O_2 contents obtained by the vacuum-fusion method, Al contents, and chemical and X-ray analyses of the non-metallic residues of alcoholic-iodine extraction. The inclusions consist mainly of α-alumina when Al is in stoichiometric excess of the O_2. An equilibrium constant of the deoxidation reaction is derived in an appendix by O. Kubaschewski. 26 ref. (D general, Fe)

167-D. The Freezing of Continuously Cast Steel. *Metal Treatment and Drop Forging,* v. 17, Spring 1950, p. 3-10. Translated and condensed from paper by H. Krainer and B. Tarmann, *Stahl und Eisen,* v. 69, Nov. 10, 1949, p. 813-819.

Previously abstracted from *Stahl und Eisen.* See item 13-D, 1950. (D9, ST)

168-D. Study of Blast-Furnace Charging Using Calcareous Minerals of Different Lump-Size Ranges. (In French.) Joseph Leflaive and Jean Lemonnier. *Revue de Métallurgie,* v. 47, Mar. 1950, p. 158-166.

Influence of size distribution of charge on efficiency and economy of blast-furnace operation. (D1, Fe)

169-D. Progress Achieved in Openhearth Steel Production by Use of Chrome-Magnesia Refractories. (In French.) Henry Barret. *Revue de Métallurgie,* v. 47, Mar. 1950, p. 211-214; discussion, p. 214.

The possibility of replacement of standard silica bricks by chrome-magnesia in openhearth furnace construction. Results indicate an increase in productivity and decrease in unit cost. (D2, ST)

170-D. Contribution to Metallurgy of the Blast Furnace. (In German.) Theo Kootz and Willy Oelsen. *Archiv für das Eisenhüttenwesen,* v. 21, Mar.-Apr. 1950, p. 77-88.

Reviews the literature and discusses the principles applying to the composition of pig iron and slag, silicon as a reducing agent, sequence of reduction in the furnace, and effects of charge composition and temperature on the reduction process. 42 ref. (D1, Fe)

171-D. Consumption of Electrodes in the Electric Steelmaking Furnace. (In German.) W. E. Schwabe. *Elektrowärme Technik,* v. 1, Mar. 1950, p. 6-8.

Causes of rapid electrode consumption in the range 600-1300° C. were studied. Recommendations for means of reducing it. (D5, ST)

172-D. Oxygen in the Converter Process. (In Polish.) A. Ludkiewicz and J. Natkaniec. *Prace Badawcze Glownego Instytutu Metallurgii i Odlewnictwa,* v. 2, no. 1, 1950, p. 71-79.

Results of theoretical analysis and of production-scale tests showing advantages of oxygen addition. 13 ref. (D2, B22, ST)

173-D. Design, Construction and Use of Steel Mill Checker Brick. *Industrial Heating,* v. 17, May 1950, p. 874, 876. Based on paper by Jay J. Seaver.

See abstract under similar title from *Iron and Steel Engineer,* item 72-D, 1950. (D2)

174-D. New Process Eases Pigment Manufacture. *Chemical Industries,* v. 66, May 1950, p. 681, 792.

Titanium slag concentrate obtained by smelting Fe-Ti ores is said to be superior for processing to titanium pigments. Iron is recovered as marketable pig iron. Description is based on U. S. Patent 2,476,453, issued to Quebec Iron and Titanium Corp. (D1, C21, T29, Fe, Ti)

175-D. Iron and Steel Making. I. The Blast Furnace—Thermodynamic Background. F. D. Richardson and J. H. E. Jeffes. *Iron and Steel,* v. 23, May 11, 1950, p. 230-238; discussion, p. 268-270.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 4-D, 1950. (D1, P12, ST, Fe)

176-D. Blast-Furnace Operation; Influence of Gas/Solid Temperature Differences. J. Taylor. *Iron and Steel,* v. 23, May 11, 1950, p. 239-243; discussion, p. 268-270.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 53-D, 1950. (D1, Fe)

177-D. B.-F. Gas Cleaning; An Analysis of Plant Performance in Great Britain. R. F. Jennings. *Iron and*

Steel, v. 23, May 11, 1950, p. 243-251; discussion, p. 270-272.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 90-D, 1950. (D1, Fe)

178-D. Particles in B.-F. Gas; Use of Curves and Nomograms for Calculating Their Motions. J. Stringer. *Iron and Steel,* v. 23, May 11, 1950, p. 251-254; discussion, p. 270-272.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 89-D, 1950. (D1, ST)

179-D. Burden Distribution; A Modified B.F. Top To Give Controlled Distribution. E. L. Diamond. *Iron and Steel,* v. 23, May 11, 1950, p. 254-258; discussion, p. 272-275.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 54-D, 1950. (D1, Fe)

180-D. Dependence of Coke Consumption on Temperature of the Blast in the Blast Furnace. (In German). Ernst Krebs. *Stahl und Eisen,* v. 70, Apr. 27, 1950, p. 358-360.

Shows that the blast temperature affects, in addition to coke consumption, other smelting conditions which, in turn, affect coke consumption and that it is therefore impossible to compute the effect of blast-temperature change on the coke consumption. (D1, Fe)

181-D. Nitrogen in Basic Steel. (In German.) Werner Gilde. *Chemische Technik,* v. 1, Dec. 1949, p. 183-185.

Methods of counteracting the effects of nitrogen (or of preventing its absorption) by adding Al and Si to the molten steel, by suitable melting practice, and by keeping the P content as low as possible. Includes graphs and tables. (D2, ST, N)

182-D. Oxygen Jets Through the Open Hearth Backwall. A. E. Reinhard. *Journal of Metals,* v. 188, June 1950, p. 835-837.

(D2, B22, ST)

183-D. Oxygen in Liquid Open-Hearth Steel—Oxidation During Tapping and Ladle Filling. T. E. Brower, J. W. Bain, and B. M. Larsen. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, June 1950, p. 851-861.

A mass of circumstantial evidence indicates that the main source of alloy losses in openhearth tapping is oxidation by air, with the steel apparently reacting with an amount of oxygen equivalent to about 30 times its own volume of air. The effect is erratic from heat to heat, depending largely on turbulence and distance of free fall of the stream of liquid metal. (D2, D9, ST)

184-D. Thermal Segregation: A Mechanism for the Segregation of Hydrogen in Steel. G. Derge and E. E. Duncan. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, June 1950, p. 884-885.

Results indicate that "thermal segregation" has much more influence on the control of hydrogen in steel than most other processing factors, such as furnace practice. (D, ST)

185-D. Magnesium Alloys Aid Desulfurization. S. L. Gertsman and B. F. Richardson. *Iron Age,* v. 165, June 15, 1950, p. 104-107.

Experiments with induction heats using two methods of introducing a 50% Al, 50% Mg alloy which indicate that sulfur in steel can be consistently reduced to 0.010-0.015%. Initial sulfur content is not important. Improves ductility. (D6, ST, Mg)

186-D. Session on Basic Open Hearth Quality and Metallurgy at Silver Anniversary Open Hearth Conference. B. B. Rosenbaum. *Industrial Heating,* v. 17, May 1950, p. 832, 834, 836, 838, 840.

Summarizes proceedings of conference. Effect of Al on steel quality; hydrogen in steel; and vanadium as a deoxidizer. (To be continued.) (D2, ST)

187-D. Special Ladle Technique Eliminates 90% of Sulphur in Iron. E. P. Best. *Steel,* v. 126, June 19, 1950, p. 108, 110, 112.

See abstract of "Desulfurizing for the Bessemer Process", *Blast Furnace and Steel Plant,* item 63-D, 1950. (D3, D8, Fe)

188-D. The All-Basic Open Hearth: European and American. R. P. Heuer and M. A. Fay. *Journal of Metals,* v. 188, June 1950, p. 824-829; July 1950, p. 921-928.

Compares operating practices; furnace bindings, bottoms, back and front walls; and silica and basic roof construction. Basic refractories used in the openhearth roof, ports, and ends; construction of slag pockets and regenerators; fuel practices; and direct comparisons between furnaces of various design. Part Two. Research and development completed as well as that planned in basic refractories and their applications. (D2, Fe)

189-D. Electric Arc Furnace Steel Quality. Robert Sergeson. *Iron and Steel Engineer,* v. 27, June 1950, p.

100-103; discussion, p. 103-104.

Equipment and its sizes. Types of electric-furnace steels and process used for each; factors influencing quality, and tests for determining quality. (D5, ST)

190-D. Blast Furnace Gas Boosts Steam Plant Output. P. J. Berg. *Industrial Heating,* v. 17, June 1950, p. 1010, 1012, 1014, 1016.

Steam generating capacity was increased by approximately 200,000 lb. of steam at 165 psi. and power output by 7500 kw. without increasing fuel costs by utilizing approximately 2,500,000 cu.ft. daily of 110-B.t.u. per cu.ft. blast-furnace gas that previously had been wasted to the atmosphere. (D1, A8)

191-D. Session on Basic Open Hearth Quality and Metallurgy at Silver Anniversary Open Hearth Conference. II. (Concluded.) B. B. Rosenbaum. *Industrial Heating,* v. 17, June 1950, p. 1018, 1020, 1022, 1024.

Concludes summary of conference proceedings. Oxidation in tapping and ladle filling; furnace practice, such as bath temperature measurement and control; and conservation of manganese. (D2, ST)

192-D. The Use of Coke in Blast Furnaces. T. Sanderson and D. R. Wattleworth. *Journal of the Institute of Fuel,* v. 23, May 1950, p. 115-120.

Attempts to show that coke plays another role in blast-furnace operation than acting as the source of heat and reduction; and to assess quantitatively the physical properties of coke in relation to its use in the furnace. Presents findings of a statistical survey of the effect of coke quality on coke consumption. By improvement of coke quality, furnace output was increased 22%. (D1, Fe)

193-D. The Reduction of Lump Ores. R. Wild and H. L. Saunders. *Journal of the Iron and Steel Institute,* v. 165, June 1950, p. 198-214.

The over-all rate of heat transfer to the center of iron-ore lumps and the penetration of gaseous reduction. Effects of various factors upon rate of heat transfer are assessed; and the temperature lag at the center of lumps heated at a uniform rate is related to their size. Specimens of a wide range of ores were subjected to reduction by blast-furnace gas under standardized conditions. Oxygen gradient from the surface to the center was found by chemical analysis. The extent of the penetration of reduction is related to porosity of the ore which is, in general, the factor limiting reduction within the lump. 22 ref. (D1, Fe)

194-D. Improved Stainless Steel Smelting; Oxygen Lancing Reduces Chromium Loss. *Chemical Age,* v. 62, June 3, 1950, p. 819-820.

Process just developed by British steelmakers for the electric arc furnace. (D5, B22, SS)

195-D. Low-Temperature Coke as a Reactive Carbon. C. E. Lesher. *Mining Engineering,* v. 187, July 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, 1950, p. 805-810.

Results of a study of the reactivity of 950 and 1650° F. cokes as measured by relative rates of reduction of iron oxides at temperatures up to 2200° F. Three standardized combinations of Lake Superior brown iron ore with carbon were tested by similar procedures. 18 ref. (D1, B22, Fe)

196-D. Radioactive Tracers for Gas Transit Times. *Iron Age,* v. 166, July 6, 1950, p. 96.

New technique. (See abstract of "A Radio-Active Technique for Determining Gas Transit Times in a Driving Blast-Furnace", E. W. Voice, *Journal of the Iron and Steel Institute,* item 2B-319, 1949.) (D1, S19, Fe)

197-D. The Theory, Equipment and Operation of Lime Injection Through the Tuyeres of a Blast Furnace. George Steudel. *Blast Furnace and Steel Plant,* v. 38, July 1950, p. 775-778.

The purpose of lime injection is twofold; to reduce undesirable lime content in the bosh slag and to give immediate control to the hearth slag composition. (D1, Fe)

198-D. Use of Oxygen in Electric Alloy-Steel Production. *Engineering,* v. 169, June 9, 1950, p. 660-661.

Process which has permitted the production of high-grade austenitic stainless steels in carbon-arc furnaces from scrap material. A long steel tube, or "lance" is used to pass oxygen through the melts to remove, by oxidation, carbon and such elements as Si and Mn without, at the same time, causing heavy losses of Cr as a result of oxidation. (D5, B22, AY)

199-D. The Use of Oxygen in Steelmaking; Recent British Developments With Electric Furnaces. *Metallurgia,* v. 42, June 1950, p. 29-32. (D5, B22, ST)

200-D. The Use of Oxygen in Steelmaking. *Engineer,* v. 189, June 16, 1950, p. 717-718. (D general, B22, ST)

201-D. "Checkerwork" of the Modern Cowpers Stove. (In French.) M. Gérin. *Revue de Métallurgie,* v. 47, Apr. 1950, p. 295-304; discussion, p. 304-305.

Analyzes conditions of checkerwork utilization in Cowpers blast-furnace stoves. Several types of checkerwork were comparatively investigated. (D1, Fe)

202-D. Cowpers Stoves in French Metallurgical Industries. (In French.) V. Rémond. *Revue de Métallurgie,* v. 47, May 1950, p. 365-387; discussion, p. 387.

Comprehensive information concerning operation during 1948 and 1949. Conclusions concerning the type of Cowpers stove most suitable to French conditions. The various types, including checkerwork design and choice of refractories. (D1, Fe)

203-D. Slag Control in the Basic Openhearth Process. Part II. (In Polish.) A. Ludkiewicz, E. Bucko, and J. Zieba. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 1, no. 2, 1949, p. 155-161.

Further investigation of slag patterns resulted in completion of the series for the basicity range 2.0-3.2. Basicity evaluation by examination of top and bottom surfaces of the slag pancakes proved to be satisfactory in comparison with results calculated on the basis of chemical analysis. Mineralogical examination of thin sections of slag by polarized light, also examination of thin sections in reflected light, made it possible to differentiate three types of basic openhearth slag. (D2, ST)

204-D. Basic Steelmaking; A Survey of the Physical Chemistry of Sulphur. C. E. A. Shanahan. *Iron and Steel,* v. 23, June 1950, p. 279-283.

The concepts of activity and free energy. Structure of slags, desulfurization by basic slags, and basicity of slags. (To be continued.) (D general, P12, B21, ST)

205-D. The Application of Slag Control to the Manufacture of Tube Steel. J. Monaghan. *West of Scotland Iron and Steel Institute, Journal,* v. 56, 1948-49, p. 27-53; discussion, p. 53-70.

Objects of slag control, estimation of slag basicity, slag-control procedure, experimental investigations on bank erosion, and application of slag control to various steels. Methods are illustrated by detailed calculations. (D general, B21, ST)

206-D. A Statistical Investigation of Cracking in Basic Open Hearth Ingots. I. M. Mackenzie and A. J. Donald. *West of Scotland Iron and Steel Institute, Journal,* v. 56, 1948-49, p. 71-89; discussion, p. 90-97.

Statistical analysis shows that furnace practice has a considerable influence. The most important factors contributing to variance of the cracking index were found to be: tapping temperature; temperature during refining; phosphorus content; sulfur content; and teeming speed. (D2, S12, ST)

207-D. A Materials and Thermal Balance on a Modern Blast Furnace. J. Taylor, R. P. Towndrow, and J. D. Gilchrist. *West of Scotland Iron and Steel Institute, Journal,* v. 56, 1948-49, p. 126-144.

Equipment and procedures. A team of 36 men was required to make the necessary tests which were conducted over a period of 1 week. Raw-material sampling, slag and metal sampling, gas sampling, and temperature determinations on slag and metal were carried out. (D1, Fe)

208-D. Scrap Preparation and Furnace Charging as Related to Cold Metal Open Hearth Shops. W. A. Johnson. *West of Scotland Iron and Steel Institute, Journal,* v. 56, 1948-49, p. 145-168; discussion, p. 168-170.

Not concerned with history or present status, but with possible improvements from physical and mechanical viewpoints. Alternative equipment designs and methods for improving charging rate; improved scrap-preparation methods; and use of the cupola for melting scrap. Potential cost savings resulting from the latter. (D2, A8, ST)

209-D. Possibilities of Reducing Coke Consumption in the Production of Iron and Steel. (In German.) Magnus Tigerschiöld. *Stahl und Eisen,* v. 70, May 11, 1950, p. 397-403.

Various methods for reducing coke in the blast furnace. Evaluates the sponge-iron and Krupp processes. 22 ref. (D1, D8, Fe)

210-D. Efficiency Data on Electric Steel Furnaces With Inside Diameters Greater Than 3600 Mm. (In German.) Friedrich Badenheuer. *Stahl und Eisen,* v. 70, May 11, 1950, p. 403-409.

Quantitative results of a study of optimum charges, melting methods, and conditions in electric-arc furnaces. Special attention is given to the chromium charge and to the recovery of Cr from the slag. 17 ref. (D5, ST)

211-D. Plant Experiences in the Production of Bessemer Steel in a Small Converter. (In German.) Erich Lanzendörfer. *Stahl und Eisen,* v. 70, May 11, 1950, p. 409-416.

See abstract of "Evaluation of the

Bessemer Process in the Small Converter," *Neue Giesserei,* item 141-D, 1950. (D3, ST)

212-D. Increasing the Capacity of Electric-Arc Steel Furnaces by Use of Solid Charges. (In German.) Edmund Pakulla. *Stahl und Eisen,* v. 70, May 25, 1950, p. 445-452.

Various factors that affect furnace output, and methods of increasing melting rate. Performance data are tabulated and graphed. (D5, ST)

213-D. West's Largest Electric Furnace Increases Steel Making Capacity at Bethlehem Pacific. *Western Metals,* v. 8, July 1950, p. 19.

(D5, ST)

214-D. The Advance of Titanium; Increasing Use in Modern Metallurgical Processes. A. E. Williams. *Chemical Age,* v. 63, July 1, 1950, p. 23-25.

Ferrous grain-refining uses; also methods of production.

(D general, C general, Fe, Ti)

215-D. Basic Steelmaking; A Survey of the Physical Chemistry of Sulphur. (Concluded.) C. E. A. Shanahan. *Iron and Steel,* v. 23, July 1950, p. 313-316.

Reviews literature on sulfur distribution between slag and molten metal and on equilibria of the reactions involved. 29 ref. (D2, ST)

216-D. Oxygen Lancing; A New Arc Furnace Technique. *Iron and Steel,* v. 23, July 1950, p. 317-319.

Pioneer work on the application of oxygen to 100% 18-8 stainless-steel scrap charges in arc furnaces by Edgar Allen & Co., Ltd. (D5, SS)

217-D. Oxygen Lancing in Electric Arc Furnaces. *British Steelmaker,* v. 16, July 1950, p. 350-352.

Use of complete stainless-steel scrap charge in new technique. (D5, SS)

218-D. Pressure and Flow Distribution in a Model of a Venturi-Type Open-Hearth Furnace. J. A. Leys and E. T. Leigh. *Journal of the Iron and Steel Institute,* v. 165, July 1950, p. 301-306.

Measurements were made on a 1/24 scale model of a 120-ton open-hearth Venturi furnace, of pressure losses in the regenerator and uptake systems, velocity distribution in the air uptakes and in the furnace chamber, and partition of waste gases at the outgoing end of the furnace. Calculations were made of losses between various points in the furnace, and these compared with experimental results. Agreement is generally good. 14 ref. (D2, ST)

219-D. Ingot Heat Conservation; Mould and Ingot Surface Temperature Measurements. A. V. Brancker. *Journal of the Iron and Steel Institute,* v. 165, July 1950, p. 307-313.

Surface temperatures were measured at 36 positions on the four sides of a steel ingot mold. These measurements extended from teeming to stripping. Two complete sets of temperature data were obtained for two different mold positions in a casting pit during two separate top-teeming operations. Significant differences were found between temperatures on the faces of each mold and also between the two mold positions. (D9, S16, ST)

220-D. Flow and Velocities of Air and Waste Gases in Open Hearth Furnaces. H. V. Flagg. *Journal of Metals,* v. 188, Aug. 1950, p. 976-979.

Qualitative effects of design factors on the above and on optimum combustion conditions. Discussion is facilitated by designation of 14 critical areas in the furnace system. (D2, ST)

221-D. Oxygen for Carbon Reduction and Temperature Pickup. E. H. Reyer. *Journal of Metals,* v. 188, Aug. 1950, p. 982-983.

Experiences at Keystone Steel & Wire Co., Peoria, Ill. Use is standard practice during periods when extra production is needed. (D2, B22, ST)

222-D. Plant Development and Progress in the Iron and Steel Industry. A. G. Robiette and G. L. Thomas. *Metallurgia,* v. 42, July 1950, p. 67-90.

Miscellaneous auxiliary equipment. Coke ovens, blast furnaces and ore preparation, steelmaking furnaces, soaking pits and reheating furnaces, and rolling mills and presses. (D general, B14, F23, ST)

223-D. Slag Control in the Basic Electric-Arc Furnace During Production of Cast Steel, and Its Effect on Economy of Production. (In German.) Werner Trommer. *Neue Giesserei,* v. 37 (new ser., v. 3), June 29, 1950, p. 249-255.

A process for melting high-Cr scrap which permits recovery of a high percentage of the Cr, yet limits the P content of the steel. 21 ref. (D5, CI)

224-D. Discussion of "Evaluation of the Bessemer Process in the Small Converter". (In German.) Adolf Lincke. *Neue Giesserei,* v. 37 (new ser., v. 3), June 29, 1950, p. 256-257.

Discussion of recent paper by E. Lanzendörfer (item 141-D, 1950) is supplemented by a tabulated com-

parison of charges (pig iron and steel scrap: their compositions and physical properties) from cupola furnaces with acid and basic linings. (D3, ST)

225-D. Experiment on Use of High-Frequency Tube Generators. (In Russian.) N. A. Gutsula. *Promyshlennaya Energetika* (Industrial Power), v. 7, May 1950, p. 6-7.

Method of preparing ceramic condensers for sustaining voltages of up to 30 kv. during use of high-frequency tube generators for melting and heat treating steel. In this method, the rough hygroscopic surface of the condenser is covered with two coats of shellac, forming an insulating layer.

(D general, J general, ST)

226-D. British Experience With All-Basic Openhearth Furnaces. S. Feigenbaum. *Metal Progress,* v. 58, Aug. 1950, p. 218. Condensed from *Engineer,* v. 189, Feb. 10, 1950.

See item 57-D, 1950. (D2)

227-D. Dehumidification of Air for Dry Blast. John Everetts, Jr. *Industrial Heating,* v. 17, Aug. 1950, p. 1370, 1372, 1374, 1376, 1378. (A condensation.)

Four general methods of removing moisture from blast furnace air; their advantages and disadvantages. (D1)

228-D. Cottrell Electrical Precipitation Equipment in the Process Industries. N. W. Sultzer. *American Society of Mechanical Engineers,* Paper No. 50-PRI-15, 1950, 4 pages.

Equipment in general, principles involved in its operation, and applications in the pulp and paper industry, carbon black industry, phosphorus industry, and the iron and steel industry for cleaning furnace gas. (D general)

229-D. Theoretical Considerations in the Operation of Iron Blast Furnaces With Cold Oxygen Carbon-Dioxide Blast. William Bleloch. *Journal of the Chemical, Metallurgical & Mining Society of South Africa,* v. 50, May 1950, p. 255-291; discussion, p. 291-292.

The systems Fe-C-O_2 and C-O_2 are discussed in order to evaluate the feasibility of using a cold or regenerated blast composed of not less than 95% by weight of O_2 and CO_2, for operation of iron blast furnaces with coke or anthracite. Concerned essentially with the reduction of iron oxides to pig iron. Reduction of other elements such as Cr and V is also considered. Hematite smelting at high top pressure. (D1, Fe)

230-D. Improvement of Heat Exchange in a Cowper Stove by Modification of the Smoke-Exhaust System. (In French.) M. Boissin. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques,* v. 7, Jan.-Feb. 1950, p. 39-50.

Theoretical and experimental data indicate that heat exchange may be improved by proper modification of the exhaust system. (D1, Fe)

231-D. Preliminary Desulfurization in Steelmaking in the Basic Electric Furnace. (In Italian.) R. Zoja and P. Raffo. *Metallurgia Italiana,* v. 42, May 1950, p. 173-174.

Procedure for desulfurizing the steel prior to oxidation, using the reducing slag from the previous melt. (D5, ST)

232-D. Oxygen Technique Salvages Stainless Steel Scrap. *Steel,* v. 127, Aug. 28, 1950, p. 87-88.

Use by English electric steelmakers during meltdown period to utilize alloy scrap which arises during conversion. (D5, B22, A8, SS)

233-D. The Practice of Bottom Pouring Steel. Part II. (Concluded.) Charles R. Funk. *Blast Furnace and Steel Plant,* v. 38, Aug. 1950, p. 899-907.

The various materials used in the assembly, the assembly itself, and methods of assembly to assure optimum cleanliness of metal with no break-outs during pouring. (D9, ST)

234-D. Blast Furnace Tuyere Designed To Deliver Air as Required. John H. Sprow. *Blast Furnace and Steel Plant,* v. 38, Aug. 1950, p. 928-929.

"Combination tuyere" designed to improve air distribution in large blast furnaces. The small-diameter segments concentrate a portion of the blast, forcing it to penetrate farther toward the center than it would normally go through a large tuyere; and the large-diameter segments spread a portion of the blast farther than it would go through a small tuyere. (D1)

235-D. Charging Practice; Its Effect on Open Hearth Output. William Schwinn. *Journal of Metals,* v. 188, Sept. 1950, p. 1089.

Summarizes operating data obtained since June 1949 at Keystone Steel & Wire Co., Peoria, Ill. (D2. ST)

236-D. Rapid Desulphurization; Treatment of Open-Hearth Metal With Liquid Slag. Alejandro Gimenez y Sanmartin. *Iron and Steel,* v. 23, Aug. 1950, p. 352-354. Translated and condensed from *Oyna* (Spanish), no. 4, Apr. 1949.

Influence of slag in steelmaking and the possibilities of the Perrin

process. The rapid and appreciable desulfurization of openhearth steel by contact with a liquid slag previously put in the pouring ladle. (D2, ST)

237-D. Several Means of Increasing the Wear Resistance of Open-Hearth Furnaces and Improving Their Operation. (In Russian.) P. P. Budnikov, D. P. Bogatskii, A. A. Lebed'kov, and Ya. L. Rozenblit. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, June 1950, p. 901-913.

Status of refractories for steel-melting furnaces was surveyed. Critical evaluation and theories concerning best use of these materials. Optimum design of openhearth furnaces on the basis of observations and production figures. (D2)

238-D. Further Investigations on the Solidification of Rimming-Steel Ingots. (In Swedish.) A. Hultgren, G. Phragmén, S. Wohlfahrt, and J. E. Ostberg. *Jernkontorets Annaler,* v. 134, no. 5, 1950, p. 189-221.

Results of an extensive study, including numerous macrographs showing blowhole distribution and macrostructure under various conditions. Effects of application of pressure during solidification were investigated for several compositions. Use of a lid, with a casting orifice, was also investigated. (D9, M28, ST)

239-D. Synthetic Pig Iron Made From Steel Scrap in a Charcoal-Fired Cupola Furnace. (In Polish.) M. Czyzewski. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 2, no. 2, 1950, p. 123-136.

Details of experimental work on above process. Includes furnace diagrams and photomicrographs. 11 ref. (D8, A8, CI)

240-D. Slag Composition and Removal of Impurities in the Basic Openhearth Process; Statistical Analysis. (In Polish.) E. Bucko. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 2, no. 2, 1950, p. 137-167.

Results of chemical analysis of basic slags from 44 heats, from openhearths of 20-50 ton capacity, working on cold charges, were subjected to statistical analysis. 13 ref. (D2, ST)

241-D. How To Choose Blast Furnace Refractories. R. P. Heuer and C. E. Grigsby. *Steel,* v. 127, Sept. 4, 1950, p. 99-100, 102, 104; Sept. 11, 1950, p. 100, 102, 105; Sept. 18, 1950, p. 126, 128, 131, 134.

Development of blast furnaces and their refractories from primitive to modern types. Recommendations for selection of refractories. (D1, Fe)

242-D. Inductive Stirring in Arc Furnaces. Sven Fornander and Folke Nilsson. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 46-66; discussion, p. 66-69.

Previously abstracted from *Journal of Metals.* See item 30-D, 1950. (D5, ST)

243-D. Obtaining Uniform Bath Composition by Reladling. J. J. Green. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 69-70; discussion, p. 70.

Previously abstracted from *Journal of Metals.* See item 8-D, 1950. (D9, SS)

244-D. Stirring With Neutral Gas. J. H. Kennedy. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 71; discussion, p. 71-72.

Disadvantages of stirring with argon gas and metallic calcium as compared with reladling stainless steel to obtain uniformity in analysis. Emphasizes need for a cheap and efficient method. (D5, D9, SS)

245-D. Paddle and Mixing Ball. W. M. Patterson. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 72; discussion, p. 72-74.

Stirring procedure at Allegheny Ludlum Steel Corp., Brackenridge, Pa. (D5, ST)

246-D. Optimelt Automatic Recalibrating Control for Arc-Furnace Regulators. R. M. Bayle. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 129-138; discussion, p. 142-155.

Previously abstracted from *Journal of Metals.* See item 16B-117, 1949. (D5)

247-D. Results of Optimum Current Control on Electric Furnaces. L. A. Wynd. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 139-142; discussion, p. 142-155.

Previously abstracted from *Journal of Metals.* See item 9-D, 1950. (D5)

248-D. Thermal Gradients and Strains During Rapid Cooling of Graphite Electrodes. H. G. MacPherson. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 177-184.

Previously abstracted from "Graphite Electrodes", *Journal of Metals,* item 154-T, 1950. (D5, T5, ST, C)

249-D. Deoxidation of Low-Carbon Rimming and Semikilled Steels Melted in 70-Ton Basic Electric Furnaces. W. W. Black. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 188-190.

Effect of FeO and temperature at tap and of carbon reduction on mold action. Effects of cold pig additions on additions of Al. (D5, ST)

250-D. Manufacture of Rimming Steel in Small Electric Furnaces. A. J. Texter. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 190-191.

Furnace, heat, use of ingot molds as stools, and control in the mold at the Firth-Sterling Steel and Carbide Corp. (D5, ST)

251-D. Deoxidation Practice on Rimmed and Semi-killed Steels by Steel Company of Canada. A. K. Moore. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 192-194.

Points out differences required from openhearth practice. (D5, ST)

252-D. Deoxidation Practice on Rimmed and Semi-killed Steels. C. H. Weimer. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 195-196.

Charge and tap temperatures used at the Copperweld Steel Co. (D5, ST)

253-D. Deoxidation Practice for Single-Slag Electric-Furnace Rimming Steel. J. R. Atkinson. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 196.

Dependence of oxygen in bath on carbon content, temperature, and oxidizing potential of the slag. Practice at the Dominion Foundries and Steel, Ltd., Hamilton, Ont. (D5, ST)

254-D. Sillimanite Roof Refractories in Basic Electric Furnaces. R. E. Wolfensperger. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 197-202; discussion, p. 202-205.

Actual performance tests comparing the use of four different brands of sillimanite refractories, the principal minerals being sillimanite, andalusite, and kyanite. (D5)

255-D. Bottom and Pouring Refractories. L. L. Wells, Jr. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 206-209; discussion, p. 209-211.

Recent developments in hearth construction, and current trends. Cleanliness problems involved with pouring-pit refractories and results of trials completed at South works, Carnegie-Illinois Steel Corp. (D5, D9)

256-D. Quality of Oxygen-Decarbonized Acid Electric Steel. Charles A. Faist and Clyde Wyman. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 219-235; discussion, p. 235-240.

Investigation of metallurgical factors affecting quality and affecting the economics of the heat. Concentrations of C, Si, and Mn at meltdown and after oxygen injections; melting rate; charge weight; heat time; power consumption; injection time; oxygen volumetric rate; rates of C, Mn, and Si removal; percentage FeO and MnO in meltdown and final slags; temperature of tap; physical and chemical properties; etc. (D5, ST)

257-D. Techniques Employed in Using Oxygen To Make Carbon Steel for Castings. Charles C. Spencer. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 241-243.

Three methods used by Electric Steel Castings Co., Indianapolis. (D5, B22, ST)

258-D. Ore, Oxygen, and Slag Volume. J. W. Juppenlatz. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 244-245.

Effect of slag volume on results and the use of oxygen for its control. (D5, B22, ST)

259-D. High-Chromium Steel in the Acid Arc Furnace. D. C. Hilty. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 246-251; discussion, p. 251-252.

Temperature observation and effect of high-carbon charge on chromium oxidation. (D5, SS)

260-D. Use of Oxygen in Production of High-Chromium Steels. C. J. Jernstrom. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 252-255; discussion, p. 255-256.

Use at the Cooper Alloy Foundry Co., Arlington, N. J., to utilize more scrap in the arc-furnace melting process for producing stainless steel. (D5, B22, SS)

261-D. Use of Oxygen in Melting Stainless Steel. W. T. Bryan. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 256-266.

Experimental and typical production heats on 20% Cr, 25% Ni grades, and application of experimental data in producing 18% Cr, 8% Ni steel. Results are compared with other published data. Includes tables and graphs. (D5, B22, SS)

262-D. Effect of Melting Practice on Hydrogen. Sam F. Carter. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 267-299; discussion, p. 299-301.

Previously abstracted from *Journal of Metals.* See item 31-D, 1950. (D5, ST, H)

263-D. Flushing Molten Steel With Neutral Gases. C. E. Sims. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 302-312; discussion, p. 312-313.

Experiments conducted with A, He, and N_2 as flushing gases in stainless and alloy steel heats. Resulting elimination of H_2 and porosity. The efficiences of the three gases are about equal; however, in the case of N_2 some dissolves in the bath. (D5, AY, SS, EG-m)

264-D. Information From the Chemical Equation. Charles Locke. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 315-322.

The quantitative significance of the chemical equation to steel production in the electric arc furnace. Environment of reaction, heat of reaction, role of chemical thermodynamics, equilibrium constant, activity coefficient, free energy, and speed of reaction. (D5, ST)

265-D. (Book) **Electric Furnace Steel Conference, Proceedings.** Vol. 7, 1949. 399 pages. 1950. American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York 18, N. Y.

Papers on materials handling; temperature and composition measurements; operating improvements; electric-furnace refractories; use of oxygen in electric furnace melting; gases other than oxygen in steel, and chemistry of electric furnace steelmaking. Many pertinent papers are abstracted separately. (D5, ST)

266-D. New Ingot Mold Coatings. J. J. Golden. *Industrial Heating,* v. 17, Sept. 1950, p. 1538, 1540, 1542, 1544, 1546; also *Journal of Metals,* v. 188, June 1950, p. 842-844.

Testing program at Gary works of Carnegie-Illinois Steel Corp., designed to develop a coating which does not give off fumes and which approaches tar in performance and costs. Darmold (a colloidal-graphite solution) and Hydropaste (flake Al plus binder) are the most promising. Tabulated data show somewhat poorer surface quality for steel from the molds coated with the new materials. New mold-coating apparatus. (D9, ST)

267-D. Acid Open Hearth Practice. B. B. Rosenbaum. *Industrial Heating,* v. 17, Sept. 1950, p. 1550, 1552, 1554.

Summarizes two papers presented at 1950 National Open Hearth Committee Conference recently held in Cincinnati: "A Study of Some of the Physical Characteristics of Acid Open Hearth Slags", by Charles R. Funk; and "Practical Interpretation of Steel Making", by C. F. Christopher. (D2, ST)

268-D. De-Dusting the Bessemer Converter. W. Trinks. *Blast Furnace and Steel Plant,* v. 38, Sept. 1950, p. 1040-1041.

Problems involved in prevention of evolution of dust, fumes, smoke, etc., from bessemer converters. (D3, Fe)

269-D. Novel Openhearth Has No Front Wall. S. Ichida and D. I. Brown. *Iron Age,* v. 166, Sept. 21, 1950, p. 85-87.

Openhearth design that eliminates front walls, arches, and buckstays, which has been perfected by the Japanese. Much faster scrap charging is possible. Operating costs per ton have also been reduced. (D2, ST)

270-D. Blast Furnaces Operate With All-Carbon Linings. G. D. Elliot. *Iron Age,* v. 166, Sept. 21, 1950, p. 88-91.

Experiences of Appleby-Frodingham Steel Co. (England) which have shown many advantages of carbon brick as a blast-furnace refractory. (D1)

271-D. New American Blast Furnace Designed for Carbon Lining. H. A. Brassert. *Iron Age,* v. 166, Sept. 21, 1950, p. 92-94.

Blast furnace designed to use carbon lining inside an all-welded, gastight tank. All water cooling is done on the outside. The furnace has no cooling plates in hearth, bosh walls, or inwall. Higher costs of carbon block are offset by much less copper piping and maintenance. (D1)

272-D. Acid Bessemer Hot Metal in Basic Open Hearth Steel Manufacture. C. E. Makepeace. *Canadian Mining Journal,* v. 71, Sept. 1950, p. 63-78.

An extensive quantitative study, based on full-scale commercial results, and on mechanical testing, metallographic examination, and chemical analysis of the products. (D2, D3, ST)

273-D. The Distribution of Temperature in Ingot Moulds and Its Relation to Ingot Structure. I. M. Mackenzie and Andree Donald. *Journal of the Iron and Steel Institute,* v. 166, Sept. 1950, p. 19-28.

A 3-ton ingot of mild steel fully killed with Si and Al was sectioned, and the subsurface structure examined by sulfur printing and macro-etching. Effect of convection currents in the superheated metal giving rise to banding of dendrites near the surface. An experiment to show effect of "overkilling" in producing axial porosity. Calculation of rate of heat transfer to the mold and of rate of solidification of the ingot. Factors controlling rate of heat transfer. A postulated mechanism to explain observed effects of superheat, teeming speed, and

sulfur content on incidence of cracking. (D9, N12, CN)

274-D. The Measurement of Stockline Contours on Driving Blast-Furnaces. E. W. Voice. *Journal of the Iron and Steel Institute,* v. 166, Sept. 1950, p. 84.

Radar technique for obtaining a continuous pictorial display of stockline contours. (D1)

275-D. Quantitative Evaluation of Blast Furnace Data in the Production of Foundry Pig Iron. (In German.) Ernst Feil. *Stahl und Eisen,* v. 70, June 22, 1950, p. 541-543.

Comparative evaluation of data from two blast furnaces shows various remarkable relationships between coke charge, temperature of stack gases and hot-air blast, indirect reduction, Si content, etc. (D1, Fe)

276-D. Influence of Melting Conditions on the Hardenability of Unalloyed Openhearth Steels Containing 0.4 to 1.0% C. (In German.) Max Hauck and Walter Eilender. *Stahl und Eisen,* v. 70, Aug. 3, 1950, p. 689-697; discussion, p. 697-698.

Experimental melts made in different furnaces and under variable conditions showed no effect of total O_2 content or of McQuaid-Ehn grain size. However, better results were obtained when, before tapping, O_2 content was kept low, and when the melt was kept from superheating until ready to be tapped. Suitable furnaces that permit close control of decarburizing rate and proper killing with Al and Si were found to be indispensable to production of a good hardenable steel. 20 ref. (D2, J26, CN)

277-D. Converting Basic Bessemer Pig Iron With Basic Slag. (In German.) Werner Geller. *Stahl und Eisen,* v. 70, Aug. 3, 1950, p. 707-711.

To determine optimum procedure, 3 preliminary and 16 main tests, some with and some without lime, were conducted. If a steel contains 0.5-1% P, there is a clear relationship between the Fe and free-lime contents of the slag. The Fe content in basic slag is at least 3%, but rises rapidly as the basicity drops. Suggestions for reduction of lime consumption and Fe losses and their advantages and disadvantages. 16 ref. (D3, ST)

278-D. High-Frequency Furnace for Melting and Casting in Vacuum or in a Controlled Atmosphere. (In French.) Ch. Guillaud, H. Crevaux, and H. Gondet. *Journal des Recherches du Centre National de la Recherche Scientifique,* no. 12, 1950, p. 153-155.

Principal characteristics are fusion of alloys in a crucible heated by induction in vacuum or in any atmosphere. The technique of operation. (D8)

279-D. Norway Plans Electric Smelting of Pig Iron. Brostrup M. Muller. *Canadian Metals,* v. 13, Sept. 1950, p. 12-13, 42-46.

Norwegian project said to be of paramount interest to Canadian industry as it offers a feasible alternative to blast-furnace smelting of iron ore using hydroelectric power. (D8, Fe)

280-D. Steel Engineers Talk Over New Technical Developments. *Steel,* v. 127, Oct. 9, 1950, p. 96, 98, 100.

Improvements in conveying equipment, cold rolls, metal-drawing lubricants, temper rolling, and blast-furnace and steel-plant operation brought out in 46 technical papers presented at the Fall meeting of the AISE, Cleveland, Sept. 26-29. (D general, F general, ST)

281-D. Developments in Bessemer Steelmaking Since 1940. Harold K. Work. *Metal Progress,* v. 58, Oct. 1950, p. 519-522.

A survey. (D3, ST)

282-D. Direct Iron. *Metal Progress,* v. 58, Oct. 1950, p. 532, 534. Based on a part of BIOS Overall Report No. 15, "The Ferrous Metal Industry in Germany, 1939-1949", by George Patchin and Ernest Brewin.

Krupp-Renn and Edwin sponge iron processes for direct reduction of iron ore to metal, without melting. (D8, Fe)

283-D. Surface Defects in Steel Ingots. *Metal Progress,* v. 58, Oct. 1950, p. 574, 576, 578, 580. Condensed from "First Report of the Ingot Surface Defects Subcommittee, British Iron and Steel Research Association".

Previously abstracted from *Journal of the Iron and Steel Institute;* see item 164-D, July 1950. (D9, ST)

284-D. Stud Welded Open Hearth Doors Minimize Production Losses. Robert C. Singleton. *Steel,* v. 127, Oct. 16, 1950, p. 134, 136, 138, 140, 143-144.

New technique of supporting rammed mix which extends charging-door life, saving both labor and fuel. (D2)

285-D. Dehumidification of Air for Dry Blast. John Everetts, Jr. *American Society of Mechanical Engineers,* Paper No. 50-PRI-1, 1950, 11 pages.

Previously abstracted from condensed version in *Industrial Heating.* See item 227-D, 1950 (D1)

286-D. High Magnesia Content Ramming Mixes. Rudolph Smith. *Refrac-*

tories Journal, v. 26, Sept. 1950, p. 364-367.

Experiences of Colorado Fuel and Iron Corp. with use of the above for openhearth bottoms. (D2)

287-D. All Basic Furnace Progress Report. M. F. Yarotsky. *Refractories Journal,* v. 26, Sept. 1950, p. 367-369.

Experiences of Carnegie-Illinois Steel Corp. (D2)

288-D. Comparison of Burned and Unburned Brick in Basic Ends. R. C. Solomon. *Refractories Journal,* v. 26, Sept. 1950, p. 369-370.

Experiences of Granite City Steel Co. in Illinois. (D2)

289-D. Evaluation of Operating Results of Blast Furnaces. (In German.) Helmut Kegel. *Stahl und Eisen,* v. 70, Aug. 17, 1950, p. 733-740.

Investigation of factors affecting coke consumption of several different blast furnaces. Compares data with those of other investigators, especially Wesemann (v. 68, 1948). Graphs show effects of different factors. (D1, Fe)

290-D. 550-Ton Open Hearth Shows Operating Economies. W. W. Kompart. *Steel,* v. 127, Oct. 23, 1950, p. 78, 80.

Basic brick construction of Weirton's king-size furnace cuts rebuilding costs about 25% per ton of steel produced. Use of oxygen also reduces tap-to-tap time. (D2, ST)

291-D. The Midland Works of Crucible Steel Co. of America. T. J. Ess. *Iron and Steel Engineer,* v. 27, Oct. 1950, p. M1-M19.

Plant operations from raw materials, through coke plant, blast furnace, steelmaking, blooming mills, bar and merchant mills, strip mill, heat treat and cold draw, and production of agricultural shapes. (D general, F general, ST)

292-D. Technical Aspects of Northern and Southern Blast Furnace Practice. C. G. Hogberg. *Iron and Steel Engineer,* v. 27, Oct. 1950, p. 37-47; discussion, p. 47-54.

Compares practice of blast furnaces employing widely different slag-volume relationships. This comparison is made possible by the inherent major difference in iron ores mined for consumption in the Birmingham district as compared with ores from the Lake Superior district. Includes extensive tabular data on furnace dimensions, composition of raw materials, operating data, and results. 11 ref. (D1, Fe)

293-D. Properties of Available Blast Furnace Refractories. M. A. Fay. *Iron and Steel Engineer,* v. 27, Oct. 1950, p. 55-59. (D1)

294-D. A Mineralogical Study of the Corrosion of Checker Bricks From Open-Hearth Steel Furnaces. Liang-Ho Su. *Transactions of the British Ceramic Society,* v. 49, Oct. 1950, p. 420-453.

Corroded bricks from the regenerators of two openhearth furnaces were studied. The phases present in the corrosion products were identified by microscopic and X-ray methods. Six complete quantitative chemical analyses were carried out. Development of the corrosion process. 78 ref. (D2, ST)

295-D. Oil-Fired Open-Hearth Furnaces: A Review of British Practice. T. C. Bailey. *Institute of Fuel and Institute of Petroleum,* "Modern Applications of Liquid Fuels", 1950, p. 13-25.

Delivery of oil to the furnace; burners; air supply; oil consumption; quality of steel; and instrumentation. (D2, ST)

296-D. The Open-Hearth Furnace: A Comparison of Oil and Producer Gas Firing. Iain M. D. Halliday. *Institute of Fuel and Institute of Petroleum,* "Modern Applications of Liquid Fuels", 1950, p. 26-63.

Compares data for two 80-ton venturi-type furnaces. (D2, ST)

297-D. Blast Furnace Cooling. (In French.) E. Blanc. *Revue de Métallurgie,* v. 47, Aug. 1950, p. 561-567.

Two problems exist: cooling in order to increase furnace life; and excess fuel necessary to counteract the effect of cooling on the smelting process. Different solutions proposed and accepted by industry are analyzed. (D1, Fe)

298-D. Refining With Oxygen in the Openhearth Furnace. (In French.) L. Bernard and R. Ferry. *Revue de Métallurgie,* v. 47, Aug. 1950, p. 573-581; discussion, p. 581.

Experiences of Creusot in France. (D2, B22, ST)

299-D. The Electric Furnace in Production for Fifty Years. James A. Clark. *Blast Furnace and Steel Plant,* v. 38, Oct. 1950, p. 1163-1165.

Development of modern electric arc furnaces for steel production. (D5, ST)

300-D. Open Hearth Furnaces. A. H. Leckie. *Blast Furnace and Steel Plant,* v. 38, Oct. 1950, p. 1166-1173.

See abstract of "Recent Developments in Open-Hearth Furnace Design and Operation", *Engineering,* item 10-D, 1950. (D2, ST)

301-D. Stainless by Induction Melting. R. J. Wilcox. *Journal of Metals,* v. 188, Nov. 1950, p. 1311D-1312.

Experiences of Michigan Steel Castings Co., Detroit. (D6, SS)

302-D. Developments in Blast Furnace Efficiency. (In English.) T. P. Colclough. "International Gieterij Congres 1949—Amsterdam", p. 14-29; discussion, p. 29-30.

Efficiency of fuel consumption. Conditions in the furnace, causes of low efficiency, and methods of eliminating or reducing them. (D1)

303-D. Experimental Investigation of Regulating and Preheating Air in a Blast Furnace 900 Mm. in Diameter. (In French.) P. G. Maceraudi. "International Gieterij Congres 1949—Amsterdam", p. 133-140; discussion, p. 140-141.

Compares results with and without air regulation. Results of preheating air to about 150° C. indicate that the cost of preheating is justified. (D1, Fe)

304-D. Electric Smelting of Indian Iron Ores. Herman Christiansen. *Transactions of the Indian Institute of Metals,* v. 1, Apr. 1949, p. 45-52.

Equipment and procedures. (D8, Fe)

305-D. Operation and Construction of Blast Furnaces Used for Smelting of Crude Fine Ores. (In German.) Ernst Nowak. *Stahl und Eisen,* v. 70, Sept. 14, 1950, p. 829-836.

Design and operation of the furnaces. Recommendations for optimum results. (D1, Fe)

306-D. Evaluation of Refractories for Roofs of Openhearth Furnaces by Measurement of Roof Temperatures. (In German.) Karl Georg Speith and Günther Engels. *Stahl und Eisen,* v. 70, Sept. 28, 1950, p. 861-867.

Customary test methods are critically examined and ways to improve them are proposed. Value of measurement and recording of roof temperatures as an aid in evaluation of refractories, as well as for control purposes. (D2, S16, ST)

307-D. Variation in the Life of Openhearth Furnace Roofs During the Years 1937 to 1949. (In German.) Wilhelm Baumgardt. *Stahl und Eisen,* v. 70, Sept. 28, 1950, p. 867-869.

Data show that in Germany the lives of furnace roofs consistently decreased in the period of 1940-42 as a result of the difficulty of obtaining suitable materials. This trend was reversed after 1946. A new plan for heating up new silica roofs to prevent their being damaged from too rapid expansion. (D2, ST)

308-D. Examples of Deterioration of Silica Crown Refractories of Openhearth Furnaces Having Similar Appearances, But Different Causes. (In German.) Rudolf Frerich. *Stahl und Eisen,* v. 70, Sept. 28, 1950, p. 870-873; discussion, p. 873-877.

Three examples are illustrated. Recommended procedure for joining silica brick, involving use of silica mortar. (D2, ST)

309-D. Evaluation of Openhearth Furnace Data for an Entire Furnace Campaign. (In German.) **Part I. Furnaces of 65 and 80 Tons Capacity.** Wilhelm Baumgardt and Karl Speith. **Part II. Furnaces of 100 and 150 Tons Capacity.** Georg Henks and Wolfgang Schleicher. *Stahl und Eisen,* v. 70, Sept. 28, 1950, p. 877-883.

Collected data on melting conditions, metallurgical reactions, output rate, fuel consumption, etc. (D2, ST)

310-D. New Flexible Roof Construction Cuts Furnace Maintenance Cost. *Steel,* v. 127, Nov. 20, 1950, p. 116, 118.

New double-hung "pendulum action" insulated refractory arch. Besides reducing the required number of refractory shapes, the roof is sufficiently flexible to be attached to an existing steel framework, regardless of its warped or twisted condition. The double-hung arch is designed particularly for steel-mill furnace roofs. (D general, F21, ST)

311-D. A-1 Steel From Low Grade Coke. *Steel,* v. 127, Nov. 20, 1950, p. 121-122. Based on talk by James R. Killian, Jr.

Research on the fundamental chemistry of sulfur in steelmaking. Results gave assurance that brittleness arising from sulfur in steel can be controlled. Studies were made in small electrically heated furnaces. Nearly 500 tests were made on slag-metal reactions. (D general, ST)

312-D. Iron Smelting Problems. Earle C. Smith. *Metal Progress,* v. 58, Nov. 1950, p. 721-724.

Excerpts from the Campbell Memorial Lecture. Technical and economic problems of blast-furnace operation; several possible methods for improvement. Believes that, in spite of technical inefficiency, the blast furnace will continue to be preeminent because of its superior economic performance. (To be published in full in *Transactions of the American Society for Metals.)* (D1, Fe)

313-D. Steel Ladle Refractories. Part I. F. I. Cordwell. *Refractories Journal,* v. 26, Oct. 1950, p. 415-424. Based on paper by E. Rousseau, *Chemie et Industrie,* v. 62, nos. 3-4.

Review of recent technical progress. Development of an immersion

test for evaluation of ladle refractories before placing in service. Destructive agencies acting on steelmaking-ladle linings, erosion and corrosion phenomena and their significance during ladle filling and teeming, pyroscopic resistance of the glaze, and adverse consequences of destruction of the ladle lining. Test procedure and results for a series of ladle refractories. (D9, ST)

314-D. Oxygen-Enriched Blast in the Basic Bessemer Converter. (In French.) P. Coheur, L. Marbais, and A. Grosjean. *Revue de Métallurgie,* v. 47, Sept. 1950, p. 693-698; discussion, p. 698-699.

A series of Belgian experiments performed in three different steel mills. Data indicate that the quality of the steel thus produced is nearly as good as that produced by the open-hearth process. (D3, ST)

315-D. Revival of the Acid Bessemer Process. (In Swedish.) Wilhelm Ekman. *Jernkontorets Annaler,* v. 134, no. 7, 1950, p. 301-333; discussion, p. 333-342.

Behavior of nitrogen in the acid bessemer process on the basis of investigations and experiments at Swedish works. The final nitrogen content is assumed to be the result of two simultaneous but opposing processes. On the one hand, nitrogen is taken up from the blast; on the other, nitrogen is given off when iron oxidized by the blast is reduced by the carbon in the bath. The resulting nitrogen content depends upon which of these factors predominates. A patented method for obtaining a low N content by means of ore additions and inclined blowing. New methods of dephosphorizing and desulfurizing coke pig iron make it possible to use such iron as a raw material. 14 ref. (D3, ST)

316-D. Swedish Blast Furnaces. (In Swedish.) C. G. Cedervall. *Jernkontorets Annaler,* v. 134, no. 8, 1950, p. 343-452; discussion, p. 453-460.

Detailed information on design and operation. The development in Sweden since 1913 based on an earlier similar compilation of data. Comparison between Swedish and foreign coke-fired blast furnaces. The refining of pig iron for quality steel production. Numerous tables and 20 full-page blast-furnace diagrams. 11 ref. (D1, Fe)

317-D. (Book) **Elektrostahl-Erzeugung.** (Electric-Furnace Steel Production). Franz Sommer and Hans Pollock. 338 pages. 1950. Stahleisen m.b.H., Dusseldorf, Germany. 34 DM.

Electrotechnical fundamentals; refractory materials; construction of electric furnaces; working and metallurgical operation during melting and alloying; and the economics of electric steel production. Achievements of the American electric steel industry are specially emphasized. About 200 ref. (D5, ST)

318-D. How To Prevent Blast Furnace Lining Disintegration. J. A. Shea. *Steel,* v. 127, Nov. 27, 1950, p. 74, 77-78.

Treating brickwork with sulfur and with chloride by soaking, dipping, spraying, or adding the chemical to the bonding material is shown to afford adequate protection against CO attack on refractories. (D1)

319-D. A Progress Report on Carbon in Blast Furnace. T. J. Ess. *Iron and Steel Engineer,* v. 27, Nov. 1950, p. 68-75.

Review of progress indicates that the next few years will give a positive answer concerning the merits of carbon as a blast furnace refractory. (D1)

320-D. The Oxygen Content of Soft-Iron Melts and Solubility of Oxygen in Solid Iron. (In German.) Wilhelm Anton Fischer and Hans vom Ende. *Archiv für das Eisenhüttenwesen,* v. 21, Sept.-Oct. 1950, p. 297-304; discussion, p. 304.

Melts in a high-frequency furnace with slags saturated with FeO and SiO_2 proved the validity of Nernst's theory of the distribution of O_2 between molten metal and slag. Deviation occurred only when melting in a lime crucible caused the slag to be saturated with lime. Melts made under different types of slag, including some prepared under vacuum, showed that the solubility of O_2 in solid iron is 0.05-0.06%. 11 ref. (D6, Fe)

321-D. Discussion—Iron and Steel Division; New York Meeting, February 1950. *Journal of Metals,* v. 188, Nov. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1333-1352.

Covers the following papers: "The Tin-Fusion Method for the Determination of Hydrogen in Steel", D. J. Carney, J. Chipman, and N. J. Grant (Feb. 1950); "The Sampling and Analysis of Liquid Steel for Hydrogen", D. J. Carney, J. Chipman, and N. J. Grant (Feb. 1950); "The Mechanism of Sulphur Transfer Between Carbon-Saturated Iron and CaO-SiO_2-Al_2O_3 Slags", G. Derge, W. O. Philbrook, and K. M. Goldman (Sept. 1950); "Evaluation of pH Measurements With Regard to the Basicity of Metallurgical Slag", C. W. Sherman and N. J. Grant (Nov. 1949); "The Manganese Equi-

librium Under Simple Oxide Slags", J. Chipman, J. B. Gero, and T. B. Winkler (Feb. 1950). "Equilibrium in the Reaction of Hydrogen With Oxygen in Liquid Iron", M. N. Dastur and J. Chipman (Aug. 1949). "Optical Temperature Scale and Emissivity of Liquid Iron", M. N. Dastur and N. A. Gokcen (Oct. 1949); "The Solubility of Oxygen in Liquid Iron Containing Aluminum", D. C. Hilty and W. Crafts (Feb. 1950); "Solubility of Oxygen in Liquid Iron Containing Silicon and Manganese", D. C. Hilty and W. Crafts (Feb. 1950); "Thermodynamic Properties of Sulphur in Molten Iron-Sulphur Alloys", C. W. Sherman, H. I. Elvander, and J. Chipman (Feb. 1950); "The Effect of Carbon on the Activity of Sulphur in Liquid Iron", J. P. Morris and R. C. Buehl (Feb 1950); "Side-Blow Converter Process for the Production of Low Nitrogen Steel Ingots", R. R. Webster and H. T. Clark (May 1950); and "Experimental Operation of a Basic-Lined Surface-Blown Hearth for Steel Production", C. E. Sims and F. L. Toy (Apr. 1950).
(D general, P12, S11, Fe, ST)

322-D. Faster Cooling Key to Jacquet Continuous Casting Method. *Steel,* v. 127, Dec. 4, 1950, p. 108, 110, 113.

Jacquet method, which uses multiple horizontal molds in casting steel. The arrangement protects the molten steel against oxidation before solidification. Rapid cooling of ingots gives uniform crystalline structure and limits segregation.
(D9, ST)

323-D. Basic Open Hearth Operation. *Industrial Heating,* v. 17, Nov. 1950, p. 1974, 1976, 1978, 1980.

Summarizes seven papers presented at 2nd Basic Open Hearth Operating Session held during the 33rd Conference of the National Open Hearth Steel Committee, AIME, Cincinnati, Ohio. They cover charging practice, stool stickers, mold coatings, nozzle setting, and furnace design. (D2, ST)

324-D. Recent Developments in Steel Plant Refractories and Masonry Aimed Toward Economy and Efficiency. *Industrial Heating,* v. 17, Sept. 1950, p. 1602, 1604, 1606, 1608; Nov. 1950, p. 2014, 2016, 2018, 2020-2021.

Summarizes papers presented at session on Refractories and Masonry of 33rd Conference of the National Open Hearth Steel Committee of the AIME. (D2, ST)

325-D. Practical Aspects of Tool Steel Melting. Charles F. Sawyer, Jr. *Journal of Metals,* v. 188, Dec. 1950, p. 1433-1434.

Basic electric arc melting and refining of toolsteels at Vanadium-Alloys Steel Co., Latrobe, Pa.
(D5, ST)

326-D. Deoxidizing in the Ladle With Carbortam. W. O. Ingelman and D. A. Finch. *Journal of Metals,* v. 188, Dec. 1950, p. 1439-1441.

Experiences at National Malleable & Steel Castings Co. Cost savings and improved product quality resulting from use of "Carbortam" and CaSi as acid electric furnace deoxidizers instead of Al+CaSi. (Composition of "Carbortam" is not indicated.) (D5, B22, ST)

327-D. Control of Refractory Materials. C. E. Sumpter. *Journal of Metals,* v. 188, Dec. 1950, p. 1442-1443.

Materials used in the various parts of electric furnaces, methods of checking and controlling the quality of the materials, and results of trials completed recently at South Works, Carnegie-Illinois Steel Corp. (D5, ST)

328-D. The Performance of Various Monolithic Converter Refractories. J. L. Harrison. *Iron and Steel Research Association,* "Conference on Cupola and Converter Refractories", 1949, p. 6-7; discussion, p. 13-14.

Tests made on six linings under the same operating conditions.
(D3, ST)

329-D. Laboratory Investigations of Used Monolithic Converter Materials. P. Murray. *Iron and Steel Research Association,* "Conference on Cupola and Converter Refractories", 1949, p. 8-12; discussion, p. 13-14.

Results of comparing used converter linings (used in tests described in the preceding paper by Harrison, item 328-D) and the unused original materials. (D3, ST)

330-D. Experience With Basic Bessemer Refractories. D. Bird. *Iron and Steel Research Association,* "Conference on Cupola and Converter Refractories", 1949, p. 15; discussion, p. 19-20.

Types of linings that have been used at Stewarts and Lloyds, Corby, England, in their five 25-ton converters. Results obtained. (D3, ST)

331-D. Refractory Wear and Converter Design. M. P. Newby. *Iron and Steel Research Association,* "Conference on Cupola and Converter Refractories", 1949, p. 16-18; discussion, p. 19-20.

The aerodynamic aspects.
(D3, ST)

332-D. The Relining and Patching of Converters & Cupolas. H. Parnham. *Iron and Steel Research Association,* "Conference on Cupola and Converter Refractories", 1949, p. 42-43; discussion, p. 50-51.

Emphasizes use of monolithic re-

fractories for the acid converter and the cupola. (D3, E10, ST)

333-D. Future Trends in Cupola and Converter Operation. A. H. B. Cross. *British Iron and Steel Research Association,* "Conference on Cupola and Converter Refractories", 1949, p. 48-49; discussion, p. 50-51.

Future trends in refractory problems as indicated by the papers delivered. (D3, E10, ST)

334-D. Blowing Basic Bessemer Converters With Oxygen-Enriched Air; Experiences of the Eisenwerk-Gesellschaft Maxmiliansnutte, Sulzbach-Rosenberg (Hutte). (In German.) Bruno Richthof. *Stahl und Eisen,* v. 70, Oct. 26, 1950, p. 959-961.

Results from a 20-year-old steel mill show large time, cost, and raw material savings for oxygen enrichment—more than ample to pay for increased costs. (D3, B22, ST)

335-D. Production of Low-Nitrogen Basic Bessemer Steel by Use of Oxygen-Enriched Blast. (In German.) Theo Kotz and Willy Oelsen. *Stahl und Eisen,* v. 70, Oct. 26, 1950, p. 961-962.

Results of five series of experiments made to determine how far the N_2 content in refined steel can be reduced. Low-phosphorus pig iron as well as the oxygen-enriched blast have a N_2-reducing effect. (D3, B22, ST)

336-D. Present Status of Efficiency of the Production of Steam and Electricity in Steel Plants. Energy Balances of 14 Large Steel Plants Over a Two-Month Period, During Each of the Years 1948 and 1949. (In German.) Kurt E. Poppe. *Stahl und Eisen,* v. 70, Oct. 26, 1950, p. 966-977. (D general, ST)

337-D. Introduction in Donawitz of the Double Blast Heater Without Use of Special Refractories. (In German.) Alois Vacek. *Stahl und Eisen,* v. 70, Oct. 26, 1950, p. 1014-1015.

Design of a highly efficient two-zone blast heater operated with highly purified blast-furnace throat gases. (D1, ST)

338-D Refining Basic Pig Iron With the Oxygen-Enriched Blast. (In German.) Hubert Hoff. *Stahl und Eisen,* v. 70, Oct. 26, 1950, p. 1015-1017.

Summarizes report presented to the Congres National de Recherche Metallurgique in June 1949. (D3, B22, ST)

339-D. Open Hearth Charging Time Cut 55%. L. R. Rissler. *Steel,* v. 127, Dec. 18, 1950, p. 114, 117, 120.

At Armco's new Middletown open-hearth department, 45,000-lb. loads of scrap and other charging materials are mechanically raised from ground to charging level in 25 sec. This first-of-its-kind materials handling set-up cuts furnace charging time and directly increases steel production. (D2, A5, ST)

340-D. Joint Discussion on the Papers—"Open-Hearth Furnace Models", by J. H. Chesters, A. R. Philip, R. S. Howes, and I. M. D. Halliday; "Experiments on Gaseous Mixing in Open-Hearth Furnace Models", by R. D. Collins and Miss J. D. Tyler; and "Experiments on the Gas and Fluid Flow in a Side-Blown Converter Model", by M. P. Newby. *Journal of the Iron and Steel Institute,* v. 166, Nov. 1950, p. 186-193.

Above papers were published in the Aug. 1949 issue. Includes authors' replies. (D2, D3, ST)

341-D. Experiments on Gaseous Mixing in Open-Hearth Furnace Models. Part II. Semi-Venturi Designs. R. D. Collins and J. D. Tyler. *Journal of the Iron and Steel Institute,* v. 166, Nov. 1950, p. 235-245.

The technique of using models to determine degree of mixing, described in Part I, is applied to a series of modified semi-Venturi designs. The most significant factors are size of gas port, slope of gas port, length of gas port, distance of throat from gas port, and sharpness of throat and knuckle contraction. These affect not only degree of mixing but also shape of the mixing pattern. A provisional theory of mixing is developed. (D2, ST)

342-D. (Book) **Gas Producers and Blast Furnaces; Theory and Methods of Calculation.** Wilhelm Gumz. 316 pages. 1950. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $7.00.

Development of theory and calculation methods, which can save large amounts of time and money in development of new types of gas producers and blast furnaces by reducing experimental work to a minimum. A general theory applicable to gas production in rotating-grate and slagging ash producers, to cupolas, and to blast furnaces, is presented. Part I is devoted to gas producers; Part II to blast furnaces and cupolas; and Part III to reaction kinetics. Thermodynamic data are tabulated in an appendix Numerical examples are given. (D1)

343-D. (Book) **Conference on Cupola and Converter Refractories.** 1949. 52 pages, *British Iron and Steel Research Association,* 11, Park Lane, London, W. I., England.

Contains 14 papers (13 abstracted separately) on performance, design, and developments. (D3, E10, ST)

SECTION E

FOUNDRY

1E. Melting Practice for Copper-Base Alloys. R. A. Colton. *Foundry,* v. 78, Jan. 1950, p. 56-57, 111, 114.

Reasons for gas porosity and recommended melting practices for the various types. (E10, Cu)

2E. Factors Affecting Development of Ductile Iron. Donald J. Reese. *Foundry,* v. 78, Jan. 1950, p. 58-62, 216-217.

Recent developments in production of ductile iron with emphasis on work of International Nickel. Typical applications. Effects of various alloy additions. (E25, CI)

3E. Problems in Producing Ductile Iron. Max Kuniansky. *Foundry,* v. 78, Jan. 1950, p. 62-64.

Based on application of the process developed by International Nickel Co. Many problems are involved in successful application of the process to production of a variety of castings. (E25, CI)

4E. Mechanized Foundry Makes Farm Implement Castings. Pat Dwyer. *Foundry,* v. 78, Jan. 1950, p. 66-69, 152, 154.

Procedures and equipment. (E general, T3)

5E. Modern Practice in Investment Casting. (Concluded.) Hiram Brown. *Foundry,* v. 78, Jan. 1950, p. 74-79, 182.

Effect of gating, mold temperature, and metal temperature on mechanical properties of castings. (E15)

6E. Steel Foundry Practice in Canada. Part 1. *Canadian Metals and Metallurgical Industries,* v. 12, Dec. 1949, p. 12-15, 32, 34.

How applied research has helped the industry. (E general, CI)

7E. Avoid the Commonplace: How One Western Foundry Met Competition by Developing Specialized Castings. Ray J. Thompson. *Western Metals,* v. 7, Dec. 1949, p. 21-23.

Procedures, equipment, and products of Ampco Metal, Inc., Burbank, Calif. Mechanical properties of eight Ampco alloys. (E general, Cu)

8E. Precision Casting; A Method of Accelerating the Setting of Investments. P. E. Gainsbury. *Metal Industry,* v. 75, Dec. 9, 1949, p. 497.

Technique depends primarily on use of a plaster-of-paris molding flask, in place of one of metal or cardboard. The plaster-of-paris rapidly absorbs excess liquid from the investment slurry, causing rapid hardening of the mold. (E15)

9E. Casting. *Steel,* v. 126, Jan. 2, 1949, p. 171-174.

Brief reviews and forecasts: Oxygen Gives Foundry Furnace Operators More Flexibility, G. E. Beliew. Seal of Approval Protects Buyers of Zinc Die Castings, R. Davison. Cast-Weld Construction Offers Many Economies, John Howe Hall. Caution Urged in Using Nodular Cast Iron, H. A. Schwartz. Higher Quality Castings to Result From Past Research, Charles W. Briggs. Gray Iron Still Very Useful Engineering Material, E. B. Sherwin. Severe-Service Castings in Greater Demand, John W. Juppenlatz. Sees Growth for Die Casting Industry During 1950, R. W. Dively. Foundry Mechanization Continues Expansion, Leon F. Miller. Increased Interest Seen in Shrinkage and Gas Inclusions, Harold J. Roast. Popularity of Ductile Irons Will Expand Rapidly, Raymond L. Collier. Foundries Hit Hard but Test Still to Come, Oliver Smalley. Greatest Advance Seen in Foundry Annealing Practice, James H. Lansing. Studies Casting of Hollow Sections, C. G. Raible. (E general)

10E. Die-Cast Rotors for Induction Motors. L. C. Packer. *Transactions of*

the American Institute of Electrical Engineers, v. 68, 1949, p. 253-260; discussion, p. 260-261.

Problems involved in manufacture. Die casting and machining methods. Cause of stray load losses, processing to reduce them, and suitable test methods. 19 ref. (E13, T1)

11E. Manufacture of Ingot Moulds in Cement Sand. J. G. P. Bruschke. *Foundry Trade Journal,* v. 87, Dec. 15, 1949, p. 705-709. A condensation.

The making of ingot molds of the "slab" type weighing between 2½ and 4½ tons. (E11)

12E. Casting Alloys for Permanent Magnets. Thomas A. Dickinson. *Steel,* v. 126, Jan. 9, 1950, p. 48-50, 74.

Procedures, with special emphasis on the dry-sand casting process of Arnold Engineering Co., Chicago. In contrast to usual casting jobs, the products often should have a strained crystal lattice or coarse granular structure—a characteristic normally considered undesirable. This structure limits the number of practical casting designs. Physical and mechanical property data for several common magnet alloys. (E11, SG-h)

13E. Research on an Aluminum-Silicon-Copper-Magnesium Scrap Cast Alloy, Especially Effects of Iron, Manganese, and Zinc on Shrinkage Behavior of the Alloy. (In German.) Kurt Achenbach. *Neue Giesserei,* v. 36 (new ser., v. 2), Nov. 1949, p. 347-353.

Studies show that Mn, Fe, and Zn are the cause of piping in this alloy and that their simultaneous presence merely augments the piping effect. An alloy for complex and highly stressed castings containing 5% Si, 1.5% Cu, and 0.5% Mg should not contain more than 1.1% Mn + Fe and not more than 0.3% Zn. Increasing the Cu content scarcely affects the undesirable influences of Mn, Fe, and Zn. 12 ref. (E25, Al)

14E. Permanent Molds in Nonferrous Foundries. (In German.) H. Kalpers. *Metall,* v. 3, Oct. 1949, p. 333-334.

The Büsselmann process in which the mold is made of sawdust. Experiences with several kinds of permanent molds. (E12)

15E. Junker Graphite-Bar Melting Furnace With Electrical Resistance Heating for Melting Bronzes. (In Russian.) P. Muller. *Metall,* v. 3, Nov. 1949, p. 381-383.

Design of different sizes of the furnace. Typical results for melting Al bronze. (E10, Cu)

16E. Fluidity of Metal and Methods for Its Determination. (In Russian.) Yu. A. Klyachko and L. L. Kunin. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Oct. 1949, p. 1198-1206.

An improved method for determination. Equations are interpreted for different values of variables. Factors influencing fluidity, such as structure of molten metal, overheating, etc. 17 ref. (E25)

17E. Flasks and Rigging for Steel Castings. John Howe Hall. *Foundry,* v. 78, Jan. 1950, p. 70-73, 205-208.

Various types of flasks, jackets, and bottom boards employed in the steel foundry for making different size castings. (To be concluded.) (E22, CI)

18E. Production Processes; Their Influence on Design. Part 50. Investment Casting. Roger W. Bolz. *Machine Design,* v. 22, Jan. 1950, p. 93-99, 150. (E15)

19E. Trimming Flash With Oil-Hydraulic Presses. W. C. Denison, Jr. *Die Castings,* v. 8, Jan. 1950, p. 47, 59.

Use for removing excess metal from die castings. (E24)

20E. Visit to a Patternmaking Works. *Foundry Trade Journal,* v. 87, Dec. 22, 1949, p. 741-746.

Procedures and equipment of British firm. (E17)

21E. Moulding and Core Sands for Aluminium Castings. (Concluded.) A. W. Brace. *Foundry Trade Journal,* v. 87, Dec. 22, 1949, p. 751-753.

Recommended procedures for sand treatment, dry-sand molds, cores, and core drying. (E18, Al)

22E. Casting a Large Pulley in Aluminium Alloy. W. Wilson and A. Talbot. *Foundry Trade Journal,* v. 87, Dec. 29, 1949, p. 761-770.

Details of an unusual job. (E general, Al)

23E. Example of Gating Practice for Horizontal Moulds. *Foundry Trade Journal,* v. 87, Dec. 29, 1949, p. 779-780. (E22)

24E. The Conversion of Existing Parts for Production by Die Casting. H. K. Barton. *Machinery* (London), v. 75, Dec. 29, 1949, p. 934-941.

Principles of redesign. (E13)

25E. Cracking in Light Castings. H. T. Angus. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Dec. 1949, p. 153-176.

Light castings are defined as thin gray-iron castings used primarily in domestic appliances or building industries. Design of castings; effect of composition; cupola operation; metal temperature of knockout; stacking hot castings on cold; molding; microstructure; and inoculation.

Appendix I gives quantitative data from the 12 foundries questioned; Appendix II gives results of cracking and strain-bar tests. (E25, CI)

26E. A Review of Current Hot Blast Cupola Practice. W. J. Driscoll. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Dec. 1949, p. 201-216; discussion, p. 216-219.

Includes numerous diagrams. 14 ref. (E10)

27E. Synthetic Resins as Corebinders. J. J. Sheehan. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Dec. 1949, p. 221-225; discussion, p. 226-233. (E21)

28E. Mechanization and Its Effect on Sand Control. C. S. Johnson. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Dec. 1949, p. 235-243; discussion, p. 243-248.

Elaborately mechanized sand-preparation plants, and sand control problems. (E18)

29E. (Book) **Gates and Risers for Castings.** Ed. 3. Pat Dwyer. 375 pages. 1949. Penton Publishing Co., Cleveland 13, Ohio. $6.00.

New material on sleeves and pads, knockoff risers, pouring through risers, permanent molds for aluminum, formulas for centrifugal-pouring speeds, magnesium casting systems, vacuum systems, blind risers, risers under pressure, thermotomic feeding, developments in gating malleable iron, and precision casting principles. All material in the previous edition is included. Divided into sections covering gray iron, brass and bronze, aluminum, steel, and malleable iron. (E22)

30E. (Book) **Text in Patternmaking.** Alexander V. Hanel. 314 pages. 1949. Bruce Publishing Co., 540 N. Milwaukee St., Milwaukee 1, Wis. $2.96.

First part gives general information as well as pertinent technical data. The second includes data on molding and pattern allowances, tools used in patternmaking, lumber, supplies, patternmaking machinery, pattern layout, joinery, segmental and staving construction, core prints and core boxes, gear patterns, propeller patterns, and method of using patterns in the foundry. (E17)

31E. (Book) **La Fonderie des Alliages Légers et Ultra-Légers.** (The Foundry for Light and Ultra-Light Alloys.) A. Caillon. 224 pages. 1949. Service de Documentation et d'Information Technique de l'Aeronautique, 2 rue de la Porte d'Issy, Paris 15, France. 800 fr.

Melting of magnesium, melting equipment, foundry molding sands for magnesium, foundry defects, periodic foundry-defect epidemics, running methods, repair by welding of cast Mg pieces, and ideal conditions for the development of a casting. (E general, Al, Mg)

32-E. Precision Casting Provides Low-Cost Production of Small, Intricate Parts. A. H. Allen. *Steel,* v. 125, Dec. 26, 1949, p. 50-52, 67.

Process and typical applications to steel parts. (E15, ST)

33-E. Producing As-Cast Ferritic Nodular Iron in Heavy Sections. Albert De Sy. *Metal Progress,* v. 57, Jan. 1950, p. 79.

Solid cylinders and a hollow cylinder were cast from a 4-ton ladle. Composition of the iron and of the nodulizing addition. Structures and tensile properties. (E25, CI)

34-E. Triple-Groove Sheave Casting Presents Rigging Problems; Gating and Risering Committee Makes a Survey. N. A. Birch, Chairman. *American Foundryman,* v. 17, Jan. 1950, p. 25-30.

The problem was presented to a large number of gray-iron foundries. The 65 replies are classified as center-gaters, edge-gaters, and nonconformists. The committee also made some test castings to decide whether or not risers are necessary. Typical suggested rigging arrangements. (E22, CI)

35-E. Modern Foundry Methods: Centrifugal Casting of Welding Rods. *American Foundryman,* v. 17, Jan. 1950, p. 44-47.

The rods consist of an overlay alloy facing metal used in hard-facing oil-drilling tools. (E14, T5)

36-E. Basic Principles Common to Foundry Melting Practices. Philip C. Rosenthal. *American Foundryman,* v. 17, Jan. 1950, p. 48-55.

Refining of steel during melting; slags and fluxes; deoxidizing the melt; inoculants as deoxidizers; grain-size control, gas removal by boiling or agitation; gas removal by reaction; melting under oxidizing conditions; elimination of hydrogen by gas reaction; other gas-removal methods; and avoidance of gas in castings. 13 ref. (E10, E25)

37-E. How To Select Proper Squeeze Piston Size in Molding Machines. Walter W. Eichenberger. *American Foundryman,* v. 17, Jan. 1950, p. 56-57.

Nomograph plus descriptive material. (E19)

38-E. All-Mechanical Shakeout Unit Designed. *American Foundryman,* v.

17, Jan. 1950, p. 68. From article in *Iron and Steel*, v. 22, Aug. 1949. (E24)

39-E. Moulded Pattern Plates. James Timbrell. *Pig Iron Rough Notes*, Autumn-Winter 1949-50, p. 3-13.
Recommended arrangements. (E17)

40-E. Blast Preheating for Foundry Cupolas. Ralph L. Melaney. *Industrial Gas*, v. 28, Jan. 1950, p. 6, 22, 24-25.
Recommendations. (E10)

41-E. Casting the Large Statue of Washington. Pat Dwyer. *Foundry*, v. 78, Feb. 1950, p. 70-75, 231-233.
Procedures and equipment used in plaster casting a huge bronze figure of George Washington to be unveiled at Alexandria, Va. (E16, Cu)

42-E. A Simple Fracture Test for Melt Quality of Bronze Castings. James O'Keefe, Jr., and Howard F. Taylor. *Foundry*, v. 78, Feb. 1950, p. 94-96, 234-237.
A simple test piece which will determine if unsoundness is caused by shrinkage, improper melt quality, or gas pickup from wet or unsatisfactory molds. Visual examination of a fractured V-block; transverse X-ray of a thin slab cut from the test casting; Zyglo tests; or pressure tests are suitable criteria of soundness. (E25, Cu)

43-E. Solidification of Molten Metal. Norman F. Hindle. *Foundry*, v. 78, Feb. 1950, p. 97, 222-225.
Mechanism of metal solidification and its effect on properties and design of castings. 10 ref. (E25)

44-E. Flasks and Rigging for Steel Castings. (Concluded.) John Howe Hall. *Foundry*, v. 78, Feb. 1950, p. 98-99, 135, 137-138.
How to calculate the lifting force of molten metal on the cope and cores. (E22, CI)

45-E. Casting Centrifugally in Graphite Molds. John Putchinski. *Foundry*, v. 78, Feb. 1950, p. 132, 135. Reprinted from *International Digest* (International Graphite & Electrode Corp., St. Mary's, Pa.).
Method used for a wide variety of ferrous and nonferrous castings at Allis Chalmers Mfg. Co. (E14)

46-E. Casting Alloys for Permanent Magnets. Thomas A. Dickinson. *Foundry*, v. 78, Feb. 1950, p. 146, 148, 150.
Previously abstracted from *Steel*. See item 12-E, 1950. (E11, SG-n)

47-E. Crane Drum Molded and Poured on End. Pat Dwyer. *Foundry*, v. 78, Feb. 1950, p. 158-159.
Molding and casting a 30-ft. drum weighing 19,950 lb. (E19, CI)

48-E. Production of Gray Iron Castings. R. L. Collier. *Steel*, v. 126, Jan. 23, 1950, p. 64-66, 68, 70, 73-74, 76.
Procedures and equipment. Varied applications. (E general, CI)

49-E. Production Control in a B. C. Foundry. R. M. Dyke. *Canadian Metals*, v. 13, Jan. 1950, p. 24-27.
Inoculant method of process control provides five basic specifications of gray iron from a single heat. Each specification can be modified by alloying and heat treatment. (E25, CI)

50-E. Antipiping Compounds for Steel Castings. S. L. Gertsman. *Canadian Metals*, v. 13, Jan. 1950, p. 30-33, 46.
Study of the insulating and mildly exothermic types of compound. Several of these materials in common use were submitted to a series of tests using induction-melted mild steel. Details of method, which can be readily applied by the average foundryman. (E25, CI)

51-E. Fluidity of Metals; A Review of Test Methods and Results. J. E. Worthington. *Iron and Steel*, v. 22, Dec. 1949, p. 615-619; v. 23, Jan. 1950, p. 9-11.
32 ref. (E25)

52-E. Controlling Porosity; More Jobbing Foundry Experiences. Tubal Cain. *Iron and Steel*, v. 23, Jan. 1950, p. 8.
Experiences with high-duty iron. (E25, CI)

53-E. Foundry Cores and Moulds; Vapours and Fumes Evolved From Organic Bonding Materials. W. M. Lord. *Iron and Steel*, v. 23, Jan. 1950, p. 21-25.
Surveys the literature. (E18)

54-E. Convection in Molten Metals. (In Russian.) L. I. Sokol'skaya. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR) (Section of Technical Sciences), Sept. 1949, p. 1365-1371.
Above was studied experimentally with particular reference to convective transfer of molten metal after pouring into the mold. (E23)

55-E. How Design Is Affected by Foundry Practice. Oliver Smalley. *Product Engineering*, v. 21, Feb. 1950, p. 117-121.
Ten basic rules for design of sand-cast metal parts. Specific rules relating to shape and size of parts, plus reasons for the influence of casting problems on product design, such as shrinkage allowance. (E11)

56-E. Die Casting Die Design. Part IV. (Continued.) H. K. Barton and James L. Erickson. *Tool & Die Journal*, v. 15, Feb. 1950, p. 54-56, 58, 96.
Recommended design of a water-cooled sprue post. (To be continued.) (E13)

57-E. Grain Refinement of Aluminium and Its Alloys by Small Additions of Other Elements. Myriam D. Eborall. *Journal of the Institute of Metals,* v. 76, Dec. 1949, p. 295-320.

It was found that Ti, Zr, and V are the most effective grain refiners of pure aluminum, but that boron refines the grain of the Cu-bearing alloys, its efficiency increasing with Cu content. Effects of pouring temperature and method of addition. 29 ref. (E26, Al)

58-E. The Mechanism of Grain Refinement of Sand Castings in Aluminum Alloys. A. Cibula. *Journal of the Institute of Metals,* v. 76, Dec. 1949, p. 321-360.

Measurements of undercooling before solidification in castings of various alloys were correlated with grain-sizes. The experiments showed that, except in melts containing boron, the nuclei were not crystals of the intermetallic compounds of the refining metals with Al; theoretical considerations suggested that they were particles of the simple interstitial carbides of these transition metals. 35 ref. (E26, Al)

59-E. The Effect of Grain-Size on the Tensile Properties of High-Strength Cast Aluminum Alloys. A. Cibula and R. W. Ruddle. *Journal of the Institute of Metals,* v. 76, Dec. 1949, p. 361-376.

By varying the superheating temperature before casting, test bars having different grain-sizes were produced from metal cast at the same temperature, thus making it possible to distinguish between the effects of grain-size and other factors depending upon casting temperature. In this way, coarse and fine-grained test bars of Al + 4.5% Cu were poured at several temperatures in the range 680-900° C. Some results obtained with Al + 10% Mg are also presented. 12 ref. (E26, Al)

60-E. A Method of Improving the Pressure-Tightness of Lead-Free Gun-Metal Sand Castings. W. H. Glaisher. *Journal of the Institute of Metals,* v. 76, Dec. 1949, p. 377-387.

Effect of adding P, as P-Cu, to degassed lead-free gunmetal (88:10:2 and 88:8:4 Cu-Sn-Zn) before pouring, so as to cause a controlled amount of gas absorption, resulting from reaction of the residual P with the moisture of the sand mold. By the use of P, pressure-tightness of the disc castings was improved, the best castings being equal to those in leaded gunmetal, while their mechanical properties were better. Soundness and quality were, however, inferior. (E26, Cu)

61-E. Pattern Equipment for Production Moulding. S. A. Horton. *Foundry Trade Journal,* v. 88, Jan. 5, 1950, p. 3-10; discussion, Jan. 12, 1950, p. 42-43.

Fundamentals of pattern construction and practical applications with emphasis on special requirements for quality production and for high-accuracy molding. Detailed account of many aspects of core-blowing practice. (E17).

62-E. Can the Manufacture of Malleable Cast Iron Be Improved? S. W. Palmer. *Foundry Trade Journal,* v. 88, Jan. 12, 1950, p. 31-38; Jan. 19, 1950, p. 65-68; discussion, p. 68-69.

Day-to-day problems in the light of research reported in the literature. (E general, CI)

63-E. Foundry Melting Furnaces for Copper and Nickel-Base Alloys. F. C. Evans. *Foundry Trade Journal,* v. 88, Jan. 19, 1950, p. 59-64.

Metallurgical and economic features of various units. Liability for gas absorption, composition control and metal loss, fuels available, and labor and capital costs. 14 ref. (E10, Cu, Ni)

64-E. Wear of Cupola Linings. (In French.) Pierre Nicolas. *Fonderie,* Nov. 1949, p. 1837-1838.

Recommendations in connection with cupola design and refractory compositions. (E10)

65-E. Alloys for Foundry Patterns and Matchplates; Precautions for Avoidance of Cavities. (In French.) Jean Duport and Pierre Rigaut. *Fonderie,* Nov. 1949, p. 1838-1840.

Use and composition of Al alloys for patterns. Diagrams show recommended designs. (E17, T5, Al)

66-E. Magnesium Die Casting in Germany. Part I. Alfred F. Bauer. *Modern Metals,* v. 6, Feb. 1950, p. 17-22.

The first machine designed specifically for die casting magnesium was built in 1925 in Germany. During the next 20 years, the science of die casting magnesium was carried to its highest level by German engineers. Comprehensive analysis taken from the report of Military Planning Div., Office of the Quartermaster General, U. S. Army. (To be continued.) (E13, Mg)

67-E. Investment Casting Magnesium. William F. Davenport and G. W. Orton. *Iron Age,* v. 165, Feb. 16, 1950, p. 94-96.

Air Force tests on Mg alloys AZ63 and AZ92 normally used only for sand castings show that they can be successfully cast by the lost-wax process with mechanical properties similar to standard sand castings. (E15, Mg)

68-E. How To Use Phenolic Casting Resins for Pattern Coatings. E. J. McAffee. *American Foundryman,* v. 17, Feb. 1950, p. 27-28.

Advantages over other pattern-coating materials. Recommended compounding ingredients. (E17)

69-E. Sheet Metal Forms Simplify Molding and Coremaking. Harry W. Dietert. *American Foundryman,* v. 17, Feb. 1950, p. 36-38.

(E19, E21)

70-E. Casting Steel and Iron Rolls. *American Foundryman,* v. 17, Feb. 1950, p. 42-45.

Picture story at Mackintosh-Hemphill Co., Pittsburgh. (E11, T5, ST, CI)

71-E. Closed Top System in Cupola Stack Emission Control. J. F. Drake and T. G. Kennard. *American Foundryman,* v. 17, Feb. 1950, p. 55-57.

(E10, CI)

72-E. Factors Influencing Core Sand Selection. Joseph P. Avylla. *American Foundryman,* v. 17, Feb. 1950, p. 58.

(E18)

73-E. Production of High Alloy Steel Castings. W. H. Worrilow. *Steel,* v. 126, Feb. 13, 1950, p. 89-90, 92, 94, 96; Feb. 20, 1950, p. 91-94, 102, 105.

Castings containing 8% or more of various alloying elements. Includes inspection procedures, heat treatment, research program of the Alloy Casting Institute, etc. (E11, CI)

74-E. Permanent Mold, Die and Investment Casting of Magnesium. *Magazine of Magnesium,* Feb. 1950, p. 8-11.

(E12, E13, E15, Mg)

75-E. Refractory User Calls Uniformity Greatest Need. *Brick & Clay Record,* v. 116, Feb. 1950, p. 69, 71.

Need for uniformity from shipment to shipment. Super-duty firebrick preferred over silica or mullite for back walls of melting furnaces for steel castings. (E10, CI)

76-E. Gravity Die Castings in Free Cutting Brass. *Machinery* (London), v. 76, Jan. 26, 1950, p. 133-134.

The comparatively short life of existing die materials under the severe conditions imposed by the casting of brass has prevented successful commercial production of brass die castings. On the basis of experience of a British firm, the process is shown to be not only practicable but can be carried out on an extensive scale. It does not appear that the residual stresses in such castings are excessive. (E13, Cu)

77-E. Insert Dies for Die-Castings. *Machinery* (London), v. 76, Jan. 26, 1950, p. 134-136.

Use of small inserts mounted in standard die sets to reduce die costs. (E13)

78-E. Refractories for the Foundry. A. Gunn. *Foundry Trade Journal,* v. 88, Jan. 26, 1950, p. 87-92; discussion, p. 92-94.

Problems related to cupola refractories. Types of refractories available, causes of failure in the various cupola zones, slag reactions, compositions, and functions. (E10)

79-E. Cast Permanent Magnets. A. Braybrook and D. Hadfield. *Foundry Trade Journal,* v. 88, Jan. 26, 1950, p. 95-101.

Historical development of permanent-magnet alloys showing that modern compositions necessitate production as castings, because the metals are unmachinable except by grinding. Molding, melting, pouring, and after-treatment methods for mass production. (E general, SG-n)

80-E. Foundry Practice in Sweden. R. Laroux Handley. *Foundry Trade Journal,* v. 88, Jan. 26, 1950, p. 102-105.

(E general)

81-E. Gating Systems and the Production of Some General-Engineering Castings. W. Collinge. *Foundry Trade Journal,* v. 88, Feb. 2, 1950, p. 111-115; discussion, p. 115-118, 122.

Methods developed for producing a range of ferrous castings for flameproof electric motors and an "Index" automatic machine. (E22, CI)

82-E. (Book) Atlas of Defects in Castings. Ed. 2. 75 pages. Institute of British Foundrymen, St. John Street Chambers, Deansgate, Manchester 3, England. Members, 7s., 6d.; nonmembers, 21s.

The earlier loose-leaf form, showing a few well-chosen examples of defects, is replaced by a bound volume of greater variety and number of illustrated "defects". Contains over 90 photographs, illustrating some 50 or so defects, each followed by title or classification; concise description; cause; and suggested remedy (E general)

83-E. Some Factors Influencing the Use of Ethyl Silicate in Precision Casting. H. G. Emblem, A. E. Meadowcroft, and G. E. Stockwell. *Metallurgia,* v. 41, Jan. 1950, p. 157-159.

Evaluates the suitability of a given sample in lost-wax precision-casting processes. (E15)

84-E. The "Lost Wax" Process of Precision Casting. J. S. Turnbull. *Engineer,* v. 189, Jan. 20, 1950, p. 97-99; *Engineering,* v. 169, Jan. 27, 1950, p. 107-109. A condensation.

History, procedures and equipment, and applications in industry. (E15)

85-E. Melting Steel Scrap in the Cupola: A Bibliography. *Bulletin of the British Cast Iron Research Association,* v. 10, Jan. 1950, p. 146-149.
Includes abstracts. 27 ref.
(E10, CI)

86-E. Concerning the Properties of Cast Iron Melted in the Electric Furnace. I, (In Japanese.) Toshihiro Kinshita, Akio Odawara, and Kauichi Takagi. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, May 1949, p. 31-35.
Mechanical properties, fluidity, and macrostructural defects were investigated in metals melted in basic and acid electric furnaces. Results are summarized in English.
(E25, Q general, CI)

87-E. Production Casting 30-Ton Engine Bases. C. W. Gilchrist. *Iron Age,* v. 165, Mar. 2, 1950, p. 81-85.
Data on handling molds that exceed a foundry's crane capacity and drying oven size. Time required was reduced to two days in the final production setup by development of unique handling and drying methods. (E11, CI)

88-E. Casting Grinding Balls Continuously. Pearson M. Payne and Frank G. Steinebach. *Foundry,* v. 78, Mar. 1950, p. 70-73, 217-219.
Steel grinding balls are produced automatically at a rapid rate by a special machine. Pure-copper, water-cooled, permanent molds are used. (E12, T5, CI, Cu)

89-E. The Cupola—Its Raw Materials and Operation. B. P. Mulcahy. *Foundry,* v. 78, Feb. 1950, p. 76-77, 226-230; Mar. 1950, p. 74-77, 198, 200-202.
Feb.: Recommendations concerning cupola charging equipment, metal charges, and fuel. March: Fundamental laws which govern cupola operation. (E10, CI)

90-E. Influence of Blowhole Diameter, Vent Area and Air Pressure in Core Blowing. Harold M. Gade. *Foundry,* v. 78, Mar. 1950, p. 82-83, 156, 158, 160.
Systematic experimental study made with the objective of eventually reducing core-blowing box design to an orderly science. 13 ref. (E21)

91-E. Ceramic Molds for the Foundry. Thomas A. Dickinson. *Foundry,* v. 78, Mar. 1950, p. 84-86, 144.
Present and potential uses of various types of ceramic materials as permanent molds for casting metals. Methods of making the molds and properties of typical ceramic materials. (E19)

92-E. High Strength Aluminum-Magnesium Alloy Castings. H. F. James. *Foundry,* v. 78, Mar. 1950, p. 87, 196.
Recommended foundry procedures for making sand castings of No. 220 Al-Mg alloy (10% Mg). (E11, Al)

93-E. Cupola Dust Collection. William N. Witheridge. *Foundry,* v. 78, Feb. 1950, p. 84-85, 198-202, 204-205, 208; Mar. 1950, p. 88-91, 220-229.
See abstract from *Heating and Ventilating,* item 14A-180, 1949.
(E10, A5)

94-E. The Metallurgical Laboratory in a Nonferrous Jobbing Foundry. W. A. Mader. *Foundry,* v. 78, Mar. 1950, p. 94-97, 230.
(E general, A9, EG-a)

95-E. The Thermal Properties of Non-Metallic Mold Materials. *Industrial Heating,* v. 17, Feb. 1950, p. 306, 308.
Previously abstracted from paper by R. W. Ruddle and A. L. Mincher, *Journal of the Institute of Metals.* See item 14A-170, 1949. (E19)

96-E. Suction Casting. V. N. Grudinsky, I. B. Khazan, and I. I. Finger. *Engineers' Digest,* v. 11, Feb. 1950, p. 59. Translated and condensed from *Avtomobilnaya Promyshlennost* (Automobile Industry), Aug. 1949, p. 19-21.
Improved arrangements applied to a variety of cast iron and aluminum castings including Russian automobile cylinder blocks. (E16, CI, Al)

97-E. The Mechanism of Solidification of Horizontal Steel Castings. D. R. F. West. *Journal of the Iron and Steel Institute,* v. 164, Feb. 1950, p. 182-194.
Factors which influence the macrostructures of horizontally cast steel blocks were investigated with special reference to temperature conditions and rates of solidification. Experiments were made to determine temperature conditions during the solidification of sand and chill castings, by inserting thermocouples into the mold cavity, and measuring the temperatures at intervals after pouring. Liquidus-solidus ranges of some commercial steels were investigated. 17 ref. (E25, ST)

98-E. Gas Burner Production at Stockport. A. Graham Thomson. *Foundry Trade Journal,* v. 88, Feb. 9, 1950, p. 147-149, 151.
British plant for casting of gas burners and other small iron castings. (E11, CI)

99-E. Casting Design as Influenced by Foundry Practice. Oliver Smalley. *Foundry Trade Journal,* v. 88, Feb. 9, 1950, p. 153-154.

Patternmaking in connection with design. (E17)

100-E. Standardised Gating for Moulds Cast Vertically. *Foundry Trade Journal,* v. 88, Feb. 9, 1950, p. 155. (E22)

101-E. The "Lost-Wax" Process of Precision Casting. J. S. Turnbull. *Foundry Trade Journal,* v. 88, Feb. 16, 1950, p. 179-188.

Historical aspects of the process. Sequence of operation, die and pattern making, investment and casting. Properties of castings and economics of production are related to present-day market potential. (E15)

102-E. Measurement and Regulation of the Rate of Gas Flow in the Foundry. (In French.) Henri Laplanche. *Fonderie,* Nov. 1949, p. 1819-1835; Dec. 1949, p. 1851-1868.

Different types of apparatus as applied to the cupola. Structural details and applications of each type. 18 ref. (E10, S18)

103-E. One-Piece Casting of "Francis" Turbine Rotors for a Central Power Station. (In French.) *Fonderie,* Dec. 1949, p. 1869-1872.

Casting and rigging for rotors having a diameter of 4.525 meters and weighing 42 tons. (E11, E22, CI)

104-E. Technical Status and Applicability of Die Casting. (In German.) K. Schneider and O. Barnickel. *Metall,* v. 3, Dec. 1949, p. 409-414.

Various processes, their advantages and disadvantages; mold types; mold cooling methods; shrinkage allowances for different metals and alloys; and types of pieces most suitable for the process. (E13)

105-E. Effect of Stirring on Grain Size of Solidifying Light-Metal Melts and on the Properties of Light Metals. (In German.) F. Sauerwald. *Metall,* v. 3, Dec. 1949, p. 414-415.

Experiments on Al and Mg-base alloys show that stirring in the mold, ladle, or crucible has a refining effect on the grain structure of the castings but does not always improve their mechanical properties. (E25, Al, Mg)

106-E. Research on the Formation of Cavities (Blowholes) in Castings. (In German.) Franz Roll. *Neue Giesserei,* v. 37 (new ser., v. 3), Feb. 9, 1950, p. 45-52.

Experiments made to determine the effects of various factors. Preventive measures. (E25)

107-E. Modernization Trends in the Small Foundry. Lester B. Knight. *Canadian Metals,* v. 13, Feb. 1950, p. 26-29.

Case histories show what can be done with modest capital expenditures. (E general)

108-E. Mechanized Job-Shop Foundry for Aluminum. C. H. DeLamater. *Mechanical Engineering,* v. 72, Mar. 1950, p. 211-215.

Foundry produces both sand and permanent-mold Al alloy castings ranging from a few ounces to several hundred pounds in weight. (E11, E12, A5, Al)

109-E. Multiple Casting Speeds Output of Bearing Caps. Charles H. Wick. *Machinery* (American), v. 56, Mar. 1950, p. 133-137.

Four Dodge and Plymouth cast-iron main-bearing caps are combined in one casting, resulting in increased production and accuracy. Machining operations. (E11, G17, T21, CI)

110-E. For Smooth Operation of the Casting Wheel. R. B. Moore. *Engineering and Mining Journal,* v. 151, Mar. 1950, p. 66-69.

The casting wheel is used in pouring of copper anodes and wire bars. Operating features and advantages obtainable on casting machine with Ward-Leonard drive and flywheel-damping-motor acceleration control. (E23, Cu)

111-E. Moulding Technique Aids Production. S. R. Bridger. *Foundry Trade Journal,* v. 88, Feb. 23, 1950, p. 195-200.

Improvements in molding and core-making techniques which improved the rate of production and yield of good castings per ton of metal. (E19, E21)

112-E. Basic Principles of Die Design. H. K. Barton and L. C. Barton. *Machinery* (London), v. 76, Feb. 23, 1950, p. 273-280.

Refers to die casting. (E13)

113-E. Second Operations on Die Castings Cost More Than You Think! Rupert Le Grand. *American Machinist,* v. 94, Mar. 20, 1950, p. 98-99.

In theory, die casting does most of the work on a part; but in practice, trimming and machining generally cost more than die casting. How AC Spark Plug Div., General Motors Corp. improved this situation. (E13, G15, G17)

114-E. Design Factors for Precision Castings. *American Machinist,* v. 94, Mar. 20, 1950, p. 120.

Recommendations. (E15)

115-E. Aircraft Punch and Die Casting. G. A. Robinson. *Iron Age,* v. 165, Mar. 23, 1950, p. 65-68.

Procedures followed by Northrop Aircraft to insure production of dies and punches that will accurately reproduce air-flow contours. Precautions required to prevent contamination and to hold shrinkage to a normal minimum. After melting, skimming, and fluxing, the Zn-alloy dies are cast around plaster patterns and molding-sand in a wooden flask. Then the Pb-alloy punches are cast onto the Zn-alloy dies. (E11, Pb, Zn)

116-E. Radiator Section Molds Made Four Per Minute. Pat Dwyer. *Foundry*, v. 78, Apr. 1950, p. 70-75, 201-202.

Automatic equipment and procedures for making molds for casting iron steam and hot-water heating radiators. (E19, CI)

117-E. Which Molding Method? Pat Dwyer. *Foundry*, v. 78, Apr. 1950, p. 88-89, 126, 128.

Various alternate procedures for molding a specific angle-plate gray-iron casting. (E19, CI)

118-E. Handling Materials at the Shakeout. Robert H. Herrmann. *Foundry*, v. 78, Apr. 1950, p. 90-95, 229-230.

Equipment and procedures. (E24)

119-E. Machine Molding Large Dry Sand Cores. M. J. Kellner. *Foundry*, v. 78, Apr. 1950, p. 146-148.

Use of jolt-squeeze, roll-over draw machine for this job is believed to be unique method. (E21)

120-E. A Universal Blow Plate. W. Paul Morton. *Foundry*, v. 78, Apr. 1950, p. 176-177.

Success of the plate depends upon exchangeable bushings that function as either blowhole or vent. Method of matching the corebox to the blow plate using a Plexiglas model. (E21)

121-E. Magnesium Die Casting in Germany. Part II. Cold Chamber Methods and Technical Problems. Alfred F. Bauer. *Modern Metals*, v. 6, Mar. 1950, p. 27-33.

Cold-chamber machines are compared with the hot-chamber models. Special problems such as metal temperature, die temperature, and injection interval for the two systems. (E13, Mg)

122-E. Equipment for Degassing Magnesium Alloy Melts. Alex J. Juroff. *American Foundryman*, v. 17, Mar. 1950, p. 28-29.

Simple apparatus for degassing using compressed chlorine from standard commercial cylinders. (E25, Mg)

123-E. Nodular Graphite Structures. H. Morrogh. *British Cast Iron Research Association Journal of Research and Development*, v. 3, Feb. 1950, p. 251-298.

Comprehensive report of experimental work, including a review of the literature. Principal similarities of the effects of Ce, Mg, and Ca; producing nodular structures with Ca; production of nodular structures by addition of Mg to the melt before casting; influence of Mg in cast iron; influence of Mg and Ce together on hyper-eutectic irons; Mg in hypo-eutectic cast irons; and some outstanding problems of the cerium process. Includes mechanical test data and photomicrographs. 63 ref. (E25, M27, CI)

124-E. Foundry Chaplets. R. Jolly. *British Cast Iron Research Association Journal of Research and Development*, v. 3, Feb. 1950, p. 299-315.

Previous published work and an investigation made to determine the effects of tinning procedure and thickness and composition of chaplet coatings. Includes high-quality photographs. 12 ref. (E21, L16)

125-E. Slag/Metal Reactions in the Iron Foundry. J. Bernstein. *British Cast Iron Research Association Journal of Research and Development*, v. 3, Feb. 1950, p. 317-332.

Reviews some of the literature. Chemical compositions of slags from different melting furnaces; principles of desulfurization and dephosphorization. 46 ref. (E10, CI)

126-E. Casting Copper-Lead Alloys; Theoretical Aspects—Practical Problems. P. D. Liddiard and P. G. Forrester. *Metal Industry*, v. 76, Mar. 3, 1950, p. 163-165; Mar. 10, 1950, p. 191-193.

Theoretical aspects, such as the equilibrium diagram of the system. Practical methods of casting. (E general, M24, Cu, Pb)

127-E. The Melting and Casting of Nonferrous Metals. (In Dutch.) M. Stap. *Metalen*, v. 4, Feb. 1950, p. 114-118.

A few problems connected with the above. A special method of casting Al and Mg ingots. (E general, Al, Mg)

128-E. Automatic Nitrogen Ladling. *Production Engineering & Management*, v. 25, Apr. 1950, p. 53.

Equipment for transferring molten aluminum from the melting furnace to a die-casting machine, by use of compressed nitrogen. (E13, Al)

129-E. Design Factors in Investment Casting. T. F. Frangos. *Tool Engineer*, v. 24, Apr. 1950, p. C38-C40.

Clarified by graphs and diagrams. Practice at Haynes-Stellite. (E15)

130-E. Molds Dried Rapidly and Uniformly in Car Type Oven. *Industrial Heating,* v. 17, Mar. 1950, p. 490-492, 494.

Oven used in a gray-iron foundry for efficient drying of sand molds and cores. (E18)

131-E. Pattern Engineering and Foundry Practice. *Canadian Metals,* v. 13, Mar. 1950, p. 24-27, 49.

Need for coordinating design and production of castings. Serious errors in pattern design. (E17)

132-E. Ruston & Hornsby's New Manufacturing Facilities—The Beevor Foundry. *Foundry Trade Journal,* v. 88, Mar. 16, 1950, p. 285-295.

Specifications, melting practice, dry sand and green sand molding, and routine tests. (E11, CI)

133-E. Polish Foundry Research Institute and Its Activities. (In French.) K. Gierdziejewski. *Fonderie,* Jan. 1950, p. 1903-1907.

Organization and facilities. Research programs of the past two years. (E general, A9)

134-E. Absorption of Moisture by Cores. (In French.) Pierre Nicolas. *Fonderie,* Jan. 1950, p. 1908-1913.

Method and apparatus used for determination of the above for certain bonding agents used in production of foundry cores, particularly for the case when slack cores will be re-used. (E18)

135-E. Elimination of Cracks in Reentrant Angles by Use of Chills. (In French.) Georges Blanc. *Fonderie,* Jan. 1950, p. 1915-1916.

Applicable to bronze castings. (E11, Cu)

136-E. Tilting Crucible for Permanent Molds. Arthur Q. Smith. *Industrial Gas,* v. 27, Apr. 1950, p. 10, 28.

Used for pouring permanent-mold Al castings. (E12, Al)

137-E. Steel Foundry Core and Molding Sands. John Howe Hall. *Foundry,* v. 78, Apr. 1950, p. 79, 188, 190, 192, 194, 196-198, 200.

Required properties of molding sand for production of steel castings. Tests for determining permeability, green and dry strength, and other properties of sand mixtures. (To be continued.) (E18, CI)

138-E. From a Metallurgist's Notebook: Laminated Forks. H. H. Symonds. *Metal Industry,* v. 76, Mar. 24, 1950, p. 228.

Inclusions trapped in the metal during casting were found to be the cause of laminations in forks submitted for examination. Methods used to determine the reason for this defect. Compositions are not given. (E25, M27)

139-E. Production of a Die-Cast Fuel Valve Body. *Machinery* (London), v. 76, Mar. 30, 1950, p. 465-468.

Die-casting procedure for an Al alloy valve. (E13, T7, Al)

140-E. Basic Principles of Die Design. H. K. Barton and L. C. Barton. *Machinery* (London), v. 76, Mar. 30, 1950, p. 468-470.

For die casting. Discusses positive registrations. (Continued; see item 112-E, 1950.) (E13)

141-E. Burn's Court Foundry Reconstruction. John Blakiston. *Foundry Trade Journal,* v. 88, Mar. 23, 1950, p. 307-316.

Equipment and procedures of a group of iron and steel foundries in Calcutta, India. (E general, CI)

142-E. Modern Australian Grey-Iron Foundry. V. A. Saveneh. *Foundry Trade Journal,* v. 88, Mar. 30, 1950, p. 335-340, 348.

(Ei1, CI)

143-E. Dimensions and Efficiencies of Cupola Furnaces. (In German.) Karl Roesch and Kurt Guthmann. *Neue Giesserei,* v. 37 (new ser., v. 3), Mar. 9, 1950, p. 85-92.

Design and conditions for optimum operation, based on correlation of experiences with 520 furnaces. 10 ref. (E10, CI)

144-E. Pig Iron in Ferrous Foundry Practice. (In German.) Carl W. Pfannenschmidt. *Neue Giesserei,* v. 37 (new ser., v. 3), Mar. 23, 1950, p. 105-113.

Importance of pig iron to the quality of castings. Shows that certain defects in castings can be traced back to the raw material. 16 ref. (E10, CI)

145-E. (Book) **The Solidification of Castings.** R. W. Ruddle. Institute of Metals, 4 Grosvenor Gardens, London, S.W.1, England. 10s., 6d. ($2.00)

Reviews literature concerning rates of solidification and temperature gradients in castings. First part: Gating and feeding methods, the design of feeders, and the use of chills and molding materials of different thermal properties. Second and major part: Investigations of the fundamental principles of solidification. Results of mathematical analysis, "pour-out" methods, direct temperature measurement, and electrical-analogue methods. 161 ref. (E25)

146-E. (Book) **Foundry Science.** Harry A. Schwartz. 286 pages. Pitman Publishing Corp., 2 West 45th St., New

York 14. $6.50.

An effort to interpret the findings of the scientist to the industrial technologist. Application of scientific principles, beginning with the structure of matter, in terms of electrons and protons and forces which hold atoms together as molecules. Electrical conductivity, thermal conductivity, specific heat, laws of equilibria and transformations, fluid mechanics, etc., related to foundry processes. (E general)

147-E. (Book) **Pattern Making. Ed. 8.** J. G. Horner and P. Gates. 390 pages. Technical Press, Gloucester Road, Kingston Hill, Surrey, England. 18s.

Developments in metal patterns and plate-pattern work, as well as illustrations of modern machinery for this purpose. (E17)

148-E. Principles of Gating Design; Factors Influencing Molten Steel Flow From Finger Gating Systems. W. H. Johnson, W. O. Baker, and W. S. Pellini. *American Foundryman,* v. 17, Apr. 1950, p. 106-113.

Factors which influence uniformity of discharge of molten steel into a mold cavity through multiple openings in a horizontal plane, as in finger-gating systems; or which determine sequence of flow through openings in a vertical plane, as in step-gating systems. Based on observations recorded by motion-picture photography. (E22, C1)

149-E. Test Bar Committee Reports. Walter Bonsack, chairman. *American Foundryman,* v. 17, Apr. 1950, p. 114-116.

Results of an investigation of the use of tension-test bars in the light-alloy foundry industry. The problem included several basic questions such as design of the test-bar casting including sprues, runner, gating, and risering systems used; pouring temperatures; and phases of casting production being controlled. (E23, Q27, Al, Mg)

150-E. Precision Casting Aluminum in Moist Investment Molds. H. Rosenthal and S. Lipson. *American Foundryman,* v. 17, Apr. 1950, p. 122-126.

Technique developed for retaining varying amounts of moisture in plaster-bonded investment molds in order to improve the properties of the alloys. The new mold consists of a precoat applied to the wax patterns, over which a backing investment is poured. Test bars showed an increase of 15% in tensile strength. Potential savings in investment material and in labor requirements are indicated. (E15, Al)

151-E. Optimum Aluminum Additions in Commercial Yellow Brass. R. A. Colton and R. H. Gilbert. *American Foundryman,* v. 17, Apr. 1950, p. 135-139.

Experiments were conducted to determine the effect of Al on the tensile properties and castability of commercial yellow brass while elongation is reduced continuously as Al content increases. When Al contents are in excess of 0.5%, tensile and yield strengths increase rapidly. Casting behavior, castability, and film-formation effects. (E25, Q23, Cu)

152-E. Permanent Mold Casting of Magnesium Hammer Handles. E. M. Cramer and B. Mohr. *Light Metal Age,* v. 8, Apr. 1950, p. 11, 24-25.

Recommendations on a method of casting, comparison of the strength of hickory and magnesium handles, and yield obtained in terms of metal poured. Weight requirements necessitated that the handle be hollow with a minimum wall thickness of about ⅛ in. (E12, T6, Mg)

153-E. World's Largest Induction Furnace for Aluminum Melting in Operation at Vanadium Corp. Plant. Manuel Tama. *Instrumentation,* v. 4, 1st qtr. 1950, p. 14-15. (E10, Al)

154-E. New Process Casts Soil Pipe at High Rate. William G. Gude. *Foundry,* v. 78, May 1950, p. 128-131, 258, 260.

Centrifugal casting equipment and procedure used by Combustion Engineering Superheater, Inc., at Chattanooga, Tenn. (E14, CI)

155-E. What the Foundry Expects of the Pattern Shop. Chester V. Nass. *Foundry,* v. 78, May 1950, p. 132-133, 306-309.

Cooperative planning by the engineering department, pattern shop, and foundry. Patternmaking fundamentals. (E17)

156-E. Heading and Gating Practice. Fred B. Riggan and Harold Schulte. *Foundry,* v. 78, May 1950, p. 134-137.

The important influence of the above on quality, cost, and yield in the steel foundry is illustrated by citing examples of specific castings. (E22, CI)

157-E. Navy Modernizes Foundries. Edwin Bremer. *Foundry,* v. 78, May 1950, p. 138-141, 310-312.

Various foundries of U. S. Naval Gun Factory, Washington. (E general)

158-E. Effect of Oxidation in Cupola Melting on Annealability of Mal-

leable Iron. Milton Tilley. *Foundry,* v. 78, May 1950, p. 142-143, 313.

A method for evaluating effect of oxidation. How the malleable foundry can alleviate some of its troubles with castability and annealing. (E25, J23, CI)

159-E. Automatic Features Incorporated in New Mold Drying Ovens. *Foundry,* v. 78, May 1950, p. 195.

Modern drying ovens recently installed in Oil Well Supply Co.'s foundry. (E19)

160-E. Casting Diesel Engine Bearings. Robert H. Herrmann. *Foundry,* v. 78, May 1950, p. 246, 249.

Procedures at Cleveland Graphite Bronze Co. The bearings consist of steel shells with copper-lead linings (75-85% Cu). The graphite cores used may be salvaged and re-used. (E16, Cu)

161-E. British Application of Simultaneous Jolt-Squeeze Molding Machines. A. G. Thomson. *Foundry,* v. 78, May 1950, p. 250, 253-254, 256. (E19)

162-E. Small Foundry Employs Modern Methods. *Foundry,* v. 78, May 1950, p. 262, 264.

Equipment and procedures of Brooks Furnace Co., Albion, Mich., a producer of gray-iron castings. (E11, CI)

163-E. Tilting Crucible Facilitates Casting Aluminum in Permanent Molds. *Industrial Heating,* v. 17, Apr. 1950, p. 602, 604, 741-742.

A permanent mold is fastened on the top of a tilting crucible so that when it is tilted the molten metal runs into the mold. Cycle of operation is completely automatic. (E12, Al)

164-E. Plastic Used in New Casting Process. *Modern Metals,* v. 6, Apr. 1950, p. 26.

Croning process, a new method for producing cores and molds for sand castings. (E19, E21)

165-E. Magnesium Die Casting in Germany. Part III. (Concluded.) Alfred F. Bauer. *Modern Metals,* v. 6, Apr. 1950, p. 31-35.

Report on the Mg die-casting industry in Germany. Dies and Mg alloys used by the Germans; economy of Mg die castings and several of their notable applications. (E13, Mg)

166-E. Utilization of Open-Hearth Bath-Temperature Measurements in the Production of Steel Castings. W. D. Lawther. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 168-175.

The effect that temperature may have on certain defects and mechanical properties of steel castings. (E23, S16, ST)

167-E. Metal Fluidity for a Given Steel is a Function Only of Temperature. Guy M. Neagley, Jr. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 287-291; discussion, p. 291-295.

Effect of the mold, the molten metal, inclusions, composition, and temperature on fluidity. Considers validity of title statement. (E25, ST)

168-E. Work in a Jobbing Foundry. J. F. Dowell and H. London. *Foundry Trade Journal,* v. 88, Mar. 30, p. 341-347; Apr. 6, 1950, p. 365-369.

Comprehensive review of methods of tackling the out-of-the-ordinary jobs of working with a minimum of pattern equipment, and of application of green-sand, loam-sand, and dry-sand molding. (E11)

169-E Cast-Iron Components for Gas Cookers. A. Graham Thomson. *Foundry Trade Journal,* v. 88, Apr. 13, 1950, p. 403-405.

Production by sand casting at a British factory. (E11, CI)

170-E. Centrifugal Casting of Hollow Steel Tubes of Maximum Dimensions. (In German.) Werner Luckerath. *Stahl und Eisen,* v. 70, Mar. 16, 1950, p. 209-218.

Defects, causes, and methods for their avoidance. Mold linings and the casting process are found to affect greatly the quality of the product. (E14, CN)

171-E. Some Preferred Precision Casting Alloys. *Product Engineering,* v. 21, May 1950, p. 159, 161, 163.

Tables show nominal compositions, heat treatments, physical and mechanical properties, etc., for carbon, alloy, and stainless steels; also Al, Co, Ni, and Cu alloys. (E15, Q general, P general, J general, ST, Al, Co, Ni, Cu)

172-E. Electronics Speed Core Drying. John Dawson. *Iron Age,* v. 165, May 4, 1950, p. 90-93.

Equipment and procedures. Dielectric driers are shown to produce better sand cores more economically. (E21)

173-E. Physical Limitations of Precision Castings. *Iron Age,* v. 165, May 4, 1950, p. 93.

Design factors. (E15)

174-E. New Gun Relines Cupola in One Hour. Victor E. Hillman. *Iron Age,* v. 165, May 4, 1950, p. 94-95.

A wet refractory mix is shot from a high-velocity gun reducing overall relining costs by more than 50%. No hand ramming is required. Any thickness up to 10 in. can be applied. Details of equipment, procedure, and best patching mix. (E10, CI)

175-E. Added O_2 Improves Cupola Output. E. S. Clark. *Iron Age,* v. 165, May 4, 1950, p. 96-100.

Extensive studies showed that oxygen enrichment of the cupola blast results in improved performance. Temperature at the spout was increased, less coke was needed per ton, melting rate was increased, and bridging was substantially decreased. (E10, B22, CI)

176-E. How To Use Seacoal in Molding Sands. H. L. Campbell. *Iron Age,* v. 165, May 4, 1950, p. 101-102.

Recommendation for use of finely ground bituminous coal in sand mixtures for making molds for iron castings. Proper blending for improved surfaces of the castings, and low ash, sulfur, and moisture contents, are essential. (E18, CI)

177-E. Production in Brass. Frank P. Cavenagh. *Western Machinery and Steel World,* v. 41, Apr. 1950, p. 62-65, 97.

Manufacture of brass plumbing fittings. Emphasis is on melting, sand casting, machining, and mechanical finishing operations. (E11, G17, L10, Cu)

178-E. Influence of Temperature on Fluidity and Surface Appearance of Steel Castings. G. A. Lillieqvist. *American Foundrymen's Society,* Preprint No. 50-6, 1950, 6 pages.

Three types of temperature measuring equipment used in the investigation. Ladle preheat temperature, tapping temperatures, and correlation of pouring temperatures and casting defects are discussed with relation to bath-metal temperature control. (E25, S16, CI)

179-E. Influence of Dry Sand Conductivity on Rate of Freezing of Steel Slabs. V. Paschkis. *American Foundrymen's Society,* Preprint No. 50-7, 1950, 4 pages.

Changes in time of solidification when sands with different properties are used as mold material. Sands used were previously tested at Battelle Memorial Institute and described by C. F. Lucks. (E18, CI)

180-E. Nature of Mold Cavity Gases. Charles Locke and Richard L. Ashbrook. *American Foundrymen's Society,* Preprint No. 50-10, 1950, 11 pages.

Variables affecting pressures which develop in a mold cavity during pouring. Pressures were found to increase directly with increase of pouring rate and inversely with permeability. Cereal content of molding sand had an inappreciable effect on pressure. Increase of pressure had no appreciable effect on filling of the molds. Chemical analyses showed that H_2 was present in both dry and green sand molds. Other gases were CO, CO_2, N_2, O_2 and paraffins. No tests were performed to determine effects of gases on the steel. 10 ref. (E23, CI)

181-E. Some Effects of Deoxidizing Additions on Foundry Malleable Irons. R. W. Heine. *American Foundrymen's Society,* Preprint No. 50-11, 1950, 17 pages.

Extends previous laboratory work to white cast irons melted under foundry conditions. Considers above effects on nonmetallic inclusions, graphite nucleating tendencies, and rate of response to annealing. Discusses mechanical properties. (E25, Q general, CI)

182-E. A Study of Factors Affecting Molding Sand Density, Shrinkage, Expansion and Workability. R. P. Schauss, R. F. Baley, and E. E. Woodliff. *American Foundrymen's Society* Preprint No. 50-12, 1950, 9 pages.

A study of sands bonded with five common clay-type binders. Results of tests for free and confined expansion. Use of machined carbon specimen tubes in which the specimen is rammed for confined expansion. A relationship was established between these high-temperature properties and clay contents. (E18)

183-E. An Investigation of Metal Penetration in Steel Sand Cores. S. L. Gertsman and A. E. Murton. *American Foundrymen's Society,* Preprint No. 50-13, 1950, 9 pages.

Effect of "ferrostatic" pressure. The metal head of a standard casting was varied and the relative importance of different sand variables was studied. Effects of ramming, pouring temperature, core temperatures, silica-flour wash, and wood flour. (E21, CI)

184-E. Standard Data for Bench Coremaking. H. R. Williams. *American Foundrymen's Society,* Preprint No. 50-18, 1950, 7 pages.

Principles used in applying the data. Only elements presenting a measurement problem are discussed. Sample curves on method used in developing a "fill-and-ram" standard. All illustrative figures are taken from time studies used to de-

velop the data for a jobbing steel foundry. (E21, CI)

185-E. Phenolic Resin Core Binders; Effect of Core Composition on Physical Properties of Cores. J. E. McMillan and J. A. Wickett. *American Foundrymen's Society,* Preprint No. 50-20, 1950, 9 pages.

Reproducible and accurate physical property data were obtained from core mixes and correlated with core composition. Laboratory results were reproduced in the foundry. (E18)

186-E. Treatment of Bond Clays for Foundry Sand. A. E. Pavlish. *American Foundrymen's Society,* Preprint No. 50-24, 1950, 10 pages.

Treatment by base-exchange reactions, and effect of various lignin sulfonates on mechanical properties of clay-bonded sand. (E18)

187-E. Metal Melting; Application of Thermodynamic Principles to Melting Nonferrous Metals. Robert I. Moore. *American Foundrymen's Society,* Preprint No. 50-25, 1950, 5 pages.

Heat losses occurring in the furnace due to radiation, conduction, and convection. Means of achieving higher efficiency. Results for proposed conditions are calculated. (E10, EG-a)

188-E. Reproducibility of Foundry Sand Tests. B. H. Booth, P. C. Rosenthal, and H. W. Dietert. *American Foundrymen's Society,* Preprint No. 50-27, 1950, 9 pages.

Part 1 presents data from original laboratory tests. Part 2 summarizes conditions found in the various laboratories (testing identical samples) which accounted in a large part for variances from original data. (E18)

189-E. A Thermodynamic Study on Pinhole Formation in Steel Castings. Robert E. Savage and Howard F. Taylor. *American Foundrymen's Society,* Preprint No. 50-28, 1950, 4 pages.

Considers H_2CO, and other gases as causes of pinholes. (E25, P12, CI)

190-E. Fayalite Reaction in Sand Molds Used for Making Steel Castings. Robert E. Savage and Howard F. Taylor. *American Foundrymen's Society,* Preprint No. 50-29, 1950, 12 pages.

Effect of atmospheres, mold material, metal, and other variables on mold-metal interface reactions. X-ray diffraction analysis. Fayalite ($2FeO \cdot SiO_2$) was the only product formed. (E19, CI)

191-E. An Investigation of Melting and Casting Procedures for High Purity Nickel. Douglas W. Grobecker. *American Foundrymen's Society,* Preprint No. 50-31, 1950, 8 pages.

Suitable procedure in which electrolytic Ni and scrap wire are melted in a monolithic sillimanite-lined induction furnace with additions of Ni_3O_4, C, Mn, Al, and Mg. Mold materials were graphite, uncoated and coated with a fired magnesia wash; compacted carbon; core sand; and dry sand (air-dried, skin-dried, and oven-dried). 12 ref. (E10, E11, Ni)

192-E. An Alloy Designed for Pattern Shops. S. Zuckor. *American Foundrymen's Society,* Preprint No. 50-32, 1950, 2 pages.

Cu-Si-Al-Mg alloy (composition not given), its mechanical properties, and melting and pouring practice. (E10, E11, Q general, Cu)

193-E. Pattern Materials and Production in Precision Investment Casting. E. I. Valyi. *American Foundrymen's Society,* Preprint No. 50-33, 1950, 10 pages.

Methods of modifying wax compositions and development of pattern plastics. Comparative physical characteristics of pattern waxes and plastics. Use of metal patterns. (E15, E17)

194-E. Casting of Magnesium-Rare Earth-Zirconium Alloys in Sand Molds. K. E. Nelson and F. P. Strieter. *American Foundrymen's Society,* Preprint No. 50-35, 1950, 6 pages.

Metal handling, casting, and tensile and creep properties of EK30 alloy (2.0-4.0% rare earth and 0.1-0.4% Zr) at room and elevated temperatures. Rare earth refers to Mischmetal (50% Ce, 20% La, 18% Nd, 6% Pr, and other rare earths). Use in high-temperature applications. 12 ref. (E11, Mg, EG-g)

195-E. Magnesium Foundry Practice in Canada. M. W. Martinson and J. W. Meier. *American Foundrymen's Society,* Preprint No. 50-44, 1950, 8 pages.

Production, applications, techniques, and materials. 17 ref. (E general, Mg)

196-E. Flowability of Molding Sands. William H. Moore. *American Foundrymen's Society,* Preprint No. 50-46, 1950, 9 pages.

Ventability, bondability, flowability, moisture content, and flowability control. (E 18)

197-E. Basic-Lined Cupola for Iron Melting. Sam F. Carter. *American Foundrymen's Society,* Preprint No. 50-50, 1950, 17 pages.

Production experience on small cupola with comparison of metal chemistry, slag chemistry, and refractory consumption. Ways to remove 0.10-0.32% P from charges of 0.30-0.80% P content. Describes 70 experimental heats with various fluxes designed for desulfurization. (E 10, CI)

198-E. Effect of Superheating and Casting Temperatures on Physical Properties and Solidification Characteristics of Tin Bronzes. Bernard N. Ames and Noah A. Kahn. *American Foundrymen's Society,* Preprint 50-54, 1950, 18 pages.

Effects of superheating, with and without phosphor-copper deoxidation, on tensile strength, ductility, macrostructure, microstructure, density, and pressure tightness of Navy gunmetal. Density of casting, test-bar designs, and mechanism of solidification. 24 ref. (E25, Q23, Cu)

199-E. Aluminum Alloy Castings: A Review of British Achievement. Frank Hudson. *American Foundrymen's Society,* Preprint No. 50-57, 1950, 17 pages.

Alloys in use today, metallurgical developments, and production methods. 15 ref. (E general, Al)

200-E. Cold Formed Flexible "Precision" Patterns and Core Boxes. R. B. Wagner and J. E. Wiss. *American Foundrymen's Society,* Preprint No. 50-65, 1950, 5 pages.

Method of making flexible cope-and-drag multiple patterns in a new type of synthetic rubber, starting with a single loose-piece split pattern. Illustrations show steps involved in this new approach, using these cold formed synthetic rubber compounds which have setting properties similar to Plaster of Paris. 17 ref. (E17)

201-E. Production Patterns and the Matchplate. R. F. Dalton. *American Foundrymen's Society,* Preprint No. 50-66, 1950, 6 pages.

Types of pattern equipment, economics of use of Al matchplates, and use of formulated metal-casting plaster in the matchplate industry. 17 ref. (E17, T5, Al)

202-E. Crucible Furnaces—Design and Layout. Robert I. Moore. *Canadian Metals,* v. 13, Apr. 1950, p. 14-16, 19.

Use in nonferrous foundries. (E10)

203-E. Patternmaking for General Engineering Castings. H. S. W. Brittain. *Foundry Trade Journal,* v. 88, Apr. 13, 1950, p. 389-397; Apr. 20, 1950, p. 427-431; discussion, p. 432-433.

Historical background, the pattern shop itself, the equipment, and its capabilities. Pattern materials, metal patterns and coremaking. Numerous individual patterns are described as examples of green-sand, dry-sand, and loam casting. (E17)

204-E. Indian Foundry Industry. V. M. McGowan. *Foundry Trade Journal,* v. 88, Apr. 20, 1950, p. 417-423. A condensation.

The industry in general and specific information on the ferrous jobshop foundry of Indian Iron & Steel Co., Kulti, Bengal. (E general, CI)

205-E. Flow of Metal Through Runner Systems. D. F. B. Tedds. *Foundry Trade Journal,* v. 88, Apr. 27, 1950, p. 443-452.

Theoretical considerations, the practical approach, and methods of bottom gating. By using section molds in plaster-of-paris, attaching a glass front and using mercury, a photographic record of the metal stream as it enters the various designs of runner systems was obtained. For more general use, a turbulence cushion at the base of the sprue would be advantageous. 12 ref. (E22)

206-E. A Preliminary Study of the Solidification of Castings. R. W. Ruddle. *Journal of the Institute of Metals,* v. 77, Mar. 1950, p. 1-36.

Techniques for measurement of temperatures used to study the mechanism of solidification in cylinder castings made in super-purity Al; Al alloys containing 4, 8, and 30% Cu; phosphor bronze; and Al bronze. Effects of small additions of Ti on solidification of super-purity Al and of 4% Cu aluminum alloy. Results show that super-purity Al and Al bronze solidify by "skin formation". The 4% Cu alloy and the phosphor bronze solidify in a "pasty" manner, solid and liquid coexisting during the greater part of the freezing period. Solidification times of different sizes of geometrically similar cylinders of the Al-Cu alloys were calculated and found to be in fair agreement with those measured. 13 ref. (E25, Al)

207-E. Correlation of Tensile Properties of Aluminium Alloy Plate Castings With Temperature Gradients During Solidification. R. W. Ruddle. *Journal of the Institute of Metals,* v. 77, Mar. 1950, p. 37-59.

Temperature gradients existing in the above alloy containing 4.5% Cu were measured and correlated with soundness and tensile properties of specimens subsequently cut from the plates. Results show good correlation between tensile properties

and longitudinal temperature gradients existing during the latter stages of freezing. A theoretical explanation for the effects observed. 11 ref. (E25, Q27, Al)

208-E. Cupola Operation; The Proportional Blast System. N. P. Piennaar. *Iron and Steel,* v. 23, Apr. 1950, p. 111-115.

New method based on the experimentally determined ratio between melting rate and rate of air supply. It involves supplying air to the cupola in accordance with a delivery-time curve, corresponding to which a predetermined melting schedule may be followed. Theoretical and practical details, and advantages of the new technique. (E10, CI)

209-E. The Influence of Low Percentages of Certain Elements on the Microstructure of Pure Iron-Carbon Alloys and Cast Irons. W. J. Williams. *Journal of the Iron and Steel Institute,* v. 164, Apr. 1950, p. 407-422.

Influence of S, O_2, Si, and Mn was studied. Results prompted further experiments on influence of Al and O_2 additions to cast iron. Al additions modified the form of the MnS inclusions in cast irons and pure Fe-C-Mn-S alloys; vacuum melting and inoculation produced a similar effect. Experiments on synthetic production of cast iron from pure materials; also experiments on the influence of S additions to pure Fe-C-Si alloys. 16 ref. (E25, M27, CN, CI)

210-E. Laws of the Casting of Metals. (In German.) Sergei Traustel. *Metall,* v. 4, Mar. 1950, p. 85-87.

Experimentally deduced equations on cooling rates, temperature gradients, and casting rates for continuous casting of any metal. (E23)

211-E. Green Sand Casting of Steel. (In Swedish.) Nils-Ake Berglund. *Jernkontorets Annaler,* v. 134, no. 2, 1950, p. 41-83.

Purpose of investigation was to discover suitable molding sands, using Swedish raw materials. The experiments were carried out partly in the laboratory and partly on full-scale castings. For the laboratory, special testpieces were designed, for high sensitivity defects likely to arise when using green-sand molds. Formation of such defects as swells, adhesion, gas holes, scabs, sand holes, and sand inclusions. Effects of molding procedure, casting temperature, and deoxidation of the steel. 15 ref. (E18, CI)

212-E. The Process of Graphite Formation in Cast Iron. I. (In Japanese.) Isao Aoki. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Nov. 1949, p. 16-22.

Results of microstructural investigation show that the formation process for flake graphite is essentially the same as for fine graphite, although appearance is very much different. (E25, CI)

213-E. Graphitization of Fe-C Alloy. (In Japanese.) Isao Aoki. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Nov. 1949, p. 22-25.

Indicates that the formation of white, mottled, or gray cast iron is determined by rate of cooling. (E25, CI)

214-E. Influence of Certain Elements on the Formation of Nodular Graphite in Gray Cast Iron. (In Russian.) P. P. Petrosyan and S. E. Shou-Shakhbudagyan. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Mar. 1, 1950, p. 123-125.

Influence of basic alloying elements and rate of cooling on the character and form of graphite formation during addition to molten cast iron of metallic Mg and Mg alloys. (E25, CI)

215-E. Bases of Evaluation and Selection of Core Binders. (In Russian.) A. M. Lyass and I. B. Kumanin. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Jan. 1950, p. 36-44.

Hydrophobic and hydrophilic organic and inorganic binding materials were investigated for use in production of cores for foundry use. Evaluation of binding materials according to specific strength is proposed. Recommended compositions for casting of iron and steel are tabulated. (E21, CI)

216-E. New Method of Production of Chills. (In Russian.) S. S. Nekrasov. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Jan. 1950, p. 44-45.

Precision-casting technique as applied to production of cog-wheel cutters and three-sided cutters. Composition of wax molding material used; optimum conditions of casting. (E15, CI)

217-E. Design and Use of Die Casting Dies. Charles M. Franklin. *Tool Engineer,* v. 24, May 1950, p. 24-27. (E13)

218-E. Gating and Risering Tin Bronze Castings. Clyde L. Frear. *Foundry,* v. 78, May 1950, p. 126-127, 288-292.

First of series devoted to metallurgical considerations in the cast-

ing of tin bronzes. (To be continued.) (E22, Cu)

219-E. Steel Foundry Core and Molding Sands. John Howe Hall. *Foundry,* v. 78, May 1950, p. 144-145, 273-274, 276, 278, 280, 282-284, 286.

Grain shape and distribution and chemical composition and refractoriness of steel foundry sands. Effects of variations in these properties on castings produced. Second of a series of five articles. (E18, CI)

220-E. Bibliography of the Permanent Mold Process. Harold E. Bourassa. *Light Metal Age,* v. 8, Apr. 1950, p. 21, 30-34.

First installment of a classified bibliography. Early history, comparison with other casting processes, dimensional tolerances and design, and ferrous and nonferrous permanent-mold casting. (To be continued.) (E12)

221-E. Comparative Tests on Nisiloy and Other Inoculants. H. Morrogh. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Apr. 1950, p. 355-369.

Nisiloy is essentially a Ni-Si alloy containing approximately 30% Si and 60% Ni. Various experiments were made to evaluate this material as an inoculant for cast iron and to compare it with other inoculants. Mechanical tests consisted of transverse, tensile, hardness, and impact tests. (E25, Q general, CI)

222-E. Basic Principles of Die Design: Sprues, Runners and Gates for Diecastings. H. K. Barton and L. C. Barton. *Machinery* (London), v. 76, Apr. 27, 1950, p. 608-613. (E13)

223-E. Factors Controlling the Incidence of Hot-Tearing in Aluminum Casting Alloys. D. C. G. Lees. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. A78-A85; discussion, p. A117-A119.

Previously abstracted under similar title from *Metal Industry.* See item 3D-53, 1949. (E25, N12, Al)

224-E. Examples of Aluminium-Alloy Foundry Practice. J. Caven and H. W. Keeble. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. A86-A100; discussion, p. A117-A119.

Previously abstracted from *Foundry Trade Journal.* See item 14D-35, 1949. (E11, E13, Al)

225-E. Some Notable Aluminium-Alloy Castings. A. R. Martin. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. A101-A116; discussion, p. A117-A119.

Previously abstracted from *Foundry Trade Journal.* See item 14D-52 and 14D-54, 1949. (E11, Al)

226-E. Experiences With Ethyl Silicate in the Foundry. D. F. B. Tedds. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. A120-A125; discussion, p. A125-A126.

Previously abstracted from "Ethyl Silicate; Applications of Specialized Foundry Problems", *Metal Industry.* See item 14A-106, 1949. (E19, E21, E15)

227-E. Problems in Bronze Foundry Practice. Austen J. Smith. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. A127-A132; discussion, p. A132-A133.

Previously abstracted from *Foundry Trade Journal.* See item 14C-58, 1949. (E25, Cu)

228-E. Work of the Lake & Elliot Foundry Technical Committee. L. W. Sanders, C. H. Kain, R. J. Hart, W. L. Hardy, and J. W. Gardom. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. A158-A171; discussion, p. A171-A174.

Researches on cast-steel test-bars, attempts made to establish a reliable and workable machinability test development of coated molding sands in the iron foundry, and experience with resin-bonded core sands. Mechanical property data are tabulated. (E18, Q general, CI)

229-E. Effect of Grain Shape on the Behaviour of Synthetic Core and Moulding Sands. W. J. Rees. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. A175-A181; discussion, p. A181-184.

Previously abstracted from *Foundry Trade Journal.* See item 14A-134, 1949. (E18)

230-E. Casting Inspection. J. Howard Williams. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. B1-B20.

Aspects of the above in the small general foundry. Refers for the most part to high-duty cast iron, but methods described are also applicable to steel and non-ferrous castings. (E general, S13, CI)

231-E. Synthetic Resin Core Binders. G. L. Harbach. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. B30-B40; discussion, p. B40-B44.

Previously abstracted from *Foundry Trade Journal.* See item 14A-47, 1949. (E18)

232-E. Moulding and Casting a 5-ton Ingot Mould. J. Steele. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. B45-B46.

Previously abstracted from *Foundry Trade Journal.* See item 14b-117, 1948. (E19, T5, CI)

233-E. Loam Moulding of an Evaporator-Body Casting. W. H. Hornby. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. B53-B60. (E19, CI)

234-E. Factors for Immediate Consideration in Assisting in the Future Production of Medium and Heavy Iron Castings. G. W. Nicholls. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. B61-B72; discussion, p. B72-B74.

Casting design, molding recommendations, and making large castings. (E11, CI)

235-E. Making a Turbine Casting for Hydro-Electric Plant. T. Rigby. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. B75-B78; discussion, p. B78-B80.

Previously abstracted from *Foundry Trade Journal.* See item 14b-112, 1948. (E11, T25, CI)

236-E. Foundry Drying Systems. John B. Morton. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. B81-B93.

Previously abstracted from *Foundry Trade Journal.* See item 14A-11, 1949. (E19, E21)

237-E. Cores, Core-Making and Core-Making Materials. J. G. Gilbert. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. B94-B102.

Previously abstracted from *Foundry Trade Journal.* See item 14A-43, 1949. (E21)

238-E. The Solidification of Metals. E. Scheuer. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. B103-B111.

Previously abstracted from *Foundry Trade Journal.* See item 4a-46, 1948. (E25)

239-E. Repetition Patternmaking. K. L. Futter. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. B125-B128; discussion, p. B128-B131.

Previously abstracted from *Foundry Trade Journal.* See item 14a-148, 1948. (E17)

240-E. Making a Large Multi-Cylinder Diesel Crankcase. J. F. Barnes. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. B132-B145.

Coremaking and molding. (E19, E21, T25, CI)

241-E. (Book) **Foundry Sand Practice; Malleable; Steel; Gray Iron; Non-Ferrous.** Ed. 3. Clyde A. Sanders. 112 pages. 1949. American Colloid Co., Chicago.

Practical recommendations for selection and use of synthetic and natural molding sands. Various types of bonding agents. Properties and use of Volday and Panther Creek bentonite. (E11, E18, CI)

242-E. (Book) **Foundry Core Practice.** Ed. 2. Harry W. Dietert. 548 pages. American Foundrymen's Society, 222 W. Adams St., Chicago. $10.00

First edition has been completely revised. Types of core sands, locations of deposits in the U. S., core-grinding materials, core mixtures, mechanical problems of producing cores and handling sand, determining the properties of cores and core mixtures, controlling core properties, knocking out cores, reclamation of core sand, economics of core production, casting surfaces affected by core sand, mixtures, and defects caused by faulty cores. Extensive bibliography. (E21)

243-E. (Book) **Miscele di Ghisa Nella Moderna Fonderia** (Cast Iron Mixtures in the Modern Foundry.) Mario Olivo. 214 pages. Ulrico Hoepli, Milan, Italy.

Designed to enable the Italian foundryman to make the best use of the ferrous casting raw materials found in Italy. Covers materials used in casting machinery and parts in virtually all major industries. (E general, CI)

244-E. Announcing—New "Croning Process". *Bakelite Review,* v. 22, Apr. 1950, p. 22-23.

New foundry process which employs bakelite resin binders for producing cores and molds from sand. (E18)

245-E. Solidification and Structure of Cast Irons. (In French.) Armand Descy. *Fonderie,* Mar. 1950, p. 1973-1981.

Exchange paper from Belgian Foundry Assn. attempts to show that certain facts appearing exceptional and abnormal in reality should be considered as normal. Such an approach is said to result in improved interpretation of existing solidification diagrams for Fe-C-Si and Si-C in cast iron. (E25, CI)

246-E. Special Features of Molds for Gravity Casting of Aluminum Alloys. (In French.) Pierre Fouron and René Bourret. *Fonderie,* Mar. 1950, p. 1982-1986.

Factors involved in gravity casting process were investigated. Proposes five basic rules to obtain favorable results. (E11, Al)

247-E. Fabrication of Electric-Motor Rotors by Casting in Aluminum. (In French.) Gustave Caminade. *Fonderie,* Mar. 1950, p. 1992-1993.

Various methods of casting, particularly permanent mold casting; choice of alloy; and foundry equipment. (E12, Al)

248-E. Gas-Heated Melting Furnaces for Light-Metals. (In German.) Hermann Repky. *Gas und Wasserfach,* v. 91, Apr. 15, 1950, p. 89-92.

Efficiency of several crucible furnaces for light-metal melting investigated from an economic point of view. (E10, Al, Mg)

249-E. The Melting and Casting of Light Metals. (In German.) Kurt Schneider. *Neue Giesserei,* v. 37 (new ser., v. 3), Apr. 20, 1950, p. 145-148.

An illustrated, descriptive review. (E general, Al, Mg)

250-E. Artistic Foundry Practice. (In Czech.) Mojmir Cenek. *Hutnické Listy,* v. 5, Feb. 1950, p. 61-66.

The bronze casting of an artistic statue in an experimental foundry. (E11, T9, Cu)

251-E. Foundry Practice and Electrotechnique. (In Dutch.) E. M. H. Lips. *Metalen,* v. 4, Apr. 1950, p. 157-165.

Various uses of electricity in foundry practice, the testing of metals, and the uses of cast metals for electrical equipment. Electrical and magnetic properties of various metals and alloys. (T1, P15, E general)

252-E. Clay as Binder for Foundry Sand. (In Dutch.) M. Stap. *Centraal Instituut voor Materiaal Onderzoek Afdeling Metalen,* Apr. 1950, p. 2-7.

Previously abstracted from *Metalen.* See item 14A-178, 1949. (E18)

253-E. Melting and Casting of Nonferrous Metals. (In Dutch.) M. Stap. *Centraal Instituut voor Materiaal Onderzoek Afdeling Metalen,* Apr. 1950, p. 16-20.

Previously abstracted from *Metalen.* See item 127-E, 1950. (E general, EG-a)

254-E. Production of Malleable Castings. Parts I & II. James H. Lansing. *Steel,* v. 126, May 22, 1950, p. 86, 88, 91-92, 94, 97; June 5, 1950, p. 106, 108, 110, 115-116, 118.

Brief history. Equipment, procedures, and products. (E11, CI)

255-E. Modern Foundry Methods. *American Foundryman,* v. 17, May 1950, p. 74.

Equipment for dewatering core sand and electrical control for cupola mixing ladle. (E18, E10)

256-E. Further Results of Belgian Nodular Cast Iron Research. Albert De Sy. *American Foundryman,* v. 17, May 1950, p. 75-83.

Treatment with Mg was chosen for thorough investigation by the Belgian investigators. Effects of various compositions and of their factors were studied. Effects of Mg-rich alloys containing Ni, Si, and C. (E25, CI)

257-E. Malleable Iron Annealability; Excess Oxidation Effect in Cupola Melting. Milton Tilley. *American Foundryman,* v. 17, May 1950, p. 88-89.

Previously abstracted from "Effect of Oxidation in Cupola Melting on Annealability of Malleable Iron." *Foundry.* See item 158-E, 1950. (E25, J23, CI)

258-E. Redesign Steel Castings to Achieve Lower Production Costs, Improved Castability, Better Appearance, Reduced Weight. *Steel,* v. 126, June 5, 1950, p. 92-94.

Turbine casting from alloy steel. Redesign of trailer-hitch, idler gear rocker, and other parts. (E general, T25, CI)

259-E. Long Wearing Castings. *Steel,* v. 126, June 5, 1950, p. 104.

Iron castings produced by new centrifugal casting technique; they are gray-cast, require no annealing, and the castings are hard. (E14, CI)

260-E. How To Specify Diecasting Dimensions. W. W. Broughton. *Iron Age,* v. 165, June 8, 1950, p. 79-82.

Steps involved and limitations encountered. With proper dimensioning, error can be avoided and parts can be produced to high accuracy, strength, and surface finish; scrap can be reduced and metal economy achieved. (E13)

261-E. New Cupola Design Incorporates Water Cooling, Basic Lining. *Foundry,* v. 78, June 1950, p. 82-85, 193, 196, 199.

Work of Ford Motor Co. Ltd., in England, in reducing cupola-lining wear through adoption of water cooling for the melting zone; also in obtaining increased desulfurization by use of a basic lining. (E10, CI)

262-E. Casting Defects Caused by Core Gases. H. L. Campbell. *Foundry,* v. 78, June 1950, p. 86-87, 210, 212-213.

Recommendations for prevention by careful attention to the various factors involved. (E25)

263-E. Growth of an Idea. William G. Gude. *Foundry,* v. 78, June 1950, p. 88-93.

Equipment and procedures of gray-iron foundry of New Idea Division, Avco Mfg. Co. (E11, CI)

264-E. Refractories in the Foundry. W. F. Ford and J. R. Rait. *Foundry Trade Journal,* v. 88, May 11, 1950, p. 497-501; discussion, p. 501-502.

Deals particularly with silica-clay mixtures. Chemical and grading compositions, constitutions, installation, and control of the properties of seven proprietary mixtures intended for lining cupolas, converters, rotary furnaces, ladles, etc. (E10)

265-E. Casting of Large Gear Wheels. W. H. Hopkins, J. H. West, and H. G. Goyns. *Foundry Trade Journal,* v. 88, May 11, 1950, p. 503-508.

The way in which the authors would mold and cast large gear wheels in cast iron, bronze, and steel respectively. (E11, T7, CI, Cu)

266-E. Venting Arrangements and Ejector Mechanisms. H. K. and L. C. Barton. *Machinery* (London), v. 76, May 25, 1950, p. 752-759.

For die-casting equipment. (E13)

267-E. Iron-Carbon Alloys and Cast Irons; Influence of Low Percentages of Certain Elements on the Microstructure. W. J. Williams. *Iron and Steel,* v. 23, May 11, 1950, p. 220-230; discussion, p. 266-267.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 209-E, 1950. (E25, M27, CN, CI)

268-E. Fettling. *B.S.F.A. Bulletin,* v. 2, Feb. 1950, p. 1-7.

Procedures and equipment for cleaning and trimming castings to the final unmachined contours and condition desired. (E24)

269-E. Ring-Shaped Sections of Automobile Pistons Produced by Centrifugal Casting. (In Polish.) P. Januszewicz. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 1, No. 3, 1949, p. 195-201.

Difficulties of obtaining suitable structures, especially difficulties concerning shape and suitable dimensions of the graphite. Experimental study confirmed the special applicability of centrifugal casting in chills insulated with a coating of casting sand 10 mm. thick, giving a dispersed lamellar graphite. (E14, T21, CI)

270-E. Gating and Risering Tin Bronze Castings. (Continued.) Clyde L. Frear. *Foundry,* v. 78, June 1950, p. 94-95, 213-214, 216, 218.

Influence of gate location and tapered sections on internal soundness of the cast metal. (To be continued.) (E22, Cu)

271-E. Steel Foundry Core and Molding Sands. John Howe Hall. *Foundry,* v. 78, June 1950, p. 100-101, 232-243.

Concludes discussion of metal penetration into molds and cores, and takes up types of sands and binders. Physical properties and applications of such binders as clay, cereal, pitch, lignin, gilsonite, resins, and core oil. (To be continued.) (E18, CI)

272-E. Flow Calculations for Die Casting Applied to the A.S.T.M. Committee B-6 Test Casting Die. Edward Jacobi. *ASTM Bulletin,* May 1950, p. 65-69.

The equation of steady flow in filling a die-casting die is derived and solved for a range of pressures, velocities, and gate orifices. Relation to optimum die-casting die design and operation. (E13)

273-E. Making Torque Converter Parts by Plaster Casting Process. Joseph Geschelin. *Automotive Industries,* v. 102, June 1, 1950, p. 50-51, 76.

Process for producing cast aluminum torque converter parts for Packard's Ultramatic drive includes the use of cores combining dry sand structures with an assembly of plaster core pieces. Cope and drag are machine molded with green sand, in more or less conventional fashion, using metal patterns. (E16, T21, Al)

274-E. Die Cast Base Increases Versatility. *Die Castings,* v. 8, June 1950, p. 24-26.

Die casting and assembling parts for child's aluminum training chair. (E13, Al)

275-E. Plated Die Cast Tubes Solve Special Problems. *Die Castings,* v. 8, June 1950, p. 29-30, 68-70.

Die casting from Zn and chromium plating of tubes for coin changers. (E13, L17, Zn, Cr)

276-E. The Perfect Set-Up. *Die Castings,* v. 8, June 1950, p. 32-33, 70-71.

Die-cast aluminum spotting collars used in electric semi-automatic pinsetter for bowling pins. Reinforcement against impact and design. (E13, T10, Al)

277-E. Die Cast Vs. Stamped Stove Trim. *Die Castings,* v. 8, June 1950,

p. 34-35.
Procedure used at Grand Home Appliance Div. for manufacture of gas range. (E13, T10, Al, Zn)

278-E. **Five Product Design Case Histories.** David H. Thorburn. *Die Castings,* v. 8, June 1950, p. 36-41.
Die castings used in self-operating temperature regulator include the aluminum shell, aluminum radiator valve cover, zinc thermometer plates, water mixer handles, and a spiral mounting sector. (E13, T8, Al, Zn)

279-E. **Permanent-Mold Casting of Copper-Base Alloys.** G. K. Eggleston and S. E. Gregory. *Machinery* (American), v. 56, June 1950, p. 155-160.
Procedures. Data on composition and physical and mechanical properties of various alloys are tabulated and discussed. (E12, P general, Q general, Cu)

280-E. **We See How Investment Castings Are Made at the International Nickel Co.** *Plant,* v. 1, June 1950, p. 46-47.
Picture story of the lost wax method. (E15, Ni)

281-E. **Impregnation of Porous Castings With Silicate of Soda.** *Ceramic Age,* v. 55, May 1950, p. 332.
After treatment by method outlined, parts are dried and brushed to eliminate the final traces of silicate adhering to walls and metal, and can be machined and handled in the usual manner. (E25)

282-E. **Cast-in Tungsten Carbide Inserts.** *Machinery* (London), v. 76, May 18, 1950, p. 708.
Procedure in which the tungsten carbide insert is treated in such a way that it becomes completely united or "brazed" to the parent metal. (E general, W, C)

283-E. **Non-Ferrous Foundry Practice.** J. Bamford. *Foundry Trade Journal,* v. 88, May 18, 1950, p. 525-532; discussion, p. 532-533.
A general discussion, reviewing manufacturing differences between ferrous and nonferrous technique. (E general, EG-a)

284-E. **Modernizing an Iron Foundry.** L. W. Bolton and W. D. Ford. *Foundry Trade Journal,* v. 88, May 25, 1950. p. 551-558.
Factors influencing choice of molding sand and metal mixture and successful production of cores over a wide range of sizes with a standard time-temperature drying cycle. Use of automatic shakeouts and ways of securing fume and dust-free working at shakeout stations. Experience with lighting, heating, and use of color. (E18, E24, CI)

285-E. **Steel Castings Replace Fabrications; Components of a 28-Ton Rotor Reduced to Two.** *Foundry Trade Journal,* v. 88, May 25, 1950, p. 567.
Production of rotor for service in a water-driven turbo-alternator. (E11, T25, CI)

286-E. (Book) **Fundamentals in the Production and Design of Castings.** Clarence T. Marek. 384 pages. John Wiley & Son, 440 4th Ave., New York 16, N. Y. $4.00.
Stresses the importance of correlating casting design with the economical manufacture of castings. Techniques, skills, and practices of casting production. Jobbing-shop molding, theory of clay bond, patterns and cores, and new methods of high-voltage X-ray and supersonic inspection. Properties and uses of ferrous and nonferrous metals and the melting of cast metals. (E general)

287-E. **How To Build Strength Into Large Patterns.** Alfred E. Wells. *American Foundryman,* v. 17, June 1950, p. 38-39. (E17)

288-E. **Auxiliary Oxygen Applied in 72 Inch Production Cupolas.** F. J. Webbere. *American Foundryman,* v. 17, June 1950, p. 40-44.
Presents results of a series of large-scale tests sponsored by the Chevrolet Grey Iron Foundry, Saginaw, Mich. (E10, B22, CI)

289-E. **Poll Shows Principal Causes for Defective Aluminum Sand Castings.** W. E. Mahin and R. A. Lubker. *American Foundryman,* v. 17, June 1950, p. 51-54. Reprinted from *News-Casting* (U. S. Reduction Co., East Chicago, Ind.)
Results of nationwide questionnaire, survey, tabulated, illustrated, and discussed. (E11, Al)

290-E. **Core Oil Evaluation Method.** R. H. Olmsted. *American Foundryman,* v. 17, June 1950, p. 58-60.
Test data for 12 oils from 5 suppliers. Evaluation method developed as a result of analysis of the data. (E21)

291-E. **The Core of Graphite Spherules in Nodular Cast Iron.** A. L. De Sy. *Metal Progress,* v. 57, June 1950, p. 774-775.
Examination with the electron microscope proved existence of a definite, geometrically shaped core in the center of the graphite nodules. As a result it appears possible that crystallization of nodular iron is nucleated by a magnesium

compound, and that the graphite spherulite results from the decomposition of a complex magnesium-silicon-carbide. (E25, CI)

292-E. Principles of Gating. William H. Johnson, William O. Baker, and William S. Pellini. *Foundry,* v. 78, July 1950, p. 70-74, 204-208.

See abstract of "Principles of Gating Design; Factors Influencing Molten Steel Flow From Finger Gating Systems", *American Foundryman,* item 148-E, 1950. (E22, CI)

293-E. Some Experiences in Producing Ductile Iron. Edward M. State and Bernard L. Stott. *Foundry,* v. 78, July 1950, p. 80-83.

Experiences of State Foundry & Machine Co., Cedar Grove, Wis. Mechanical properties equal to or better than those claimed were obtained. Typical nodular-iron castings. (E25, CI)

294-E. Matchplate Frames Facilitate Loose Pattern Work. *Foundry,* v. 78, July 1950, p. 172, 174.

New development designed to increase foundry output which involves use of interfitting matchplates. (E17)

295-E. Precision Die Casting Lowers End Product Cost. Ed Groeling. *Production Engineering & Management,* v. 25, June 1950, p. 58-61.

Flow lock fabrication is accelerated by die casting Zn alloy parts in clusters with dies incorporating precise multiple-master inserts. (E13, Zn)

296-E. Revolution in Casting. *Modern Industry,* v. 19, June 15, 1950, p. 38-43.

New research and production developments in ferrous sand casting. Programs of Gray Iron Founders' Society, Malleable Iron Founders' Society, and Steel Founders' Societies, of Battelle and Armour, and of numerous individual companies, are reviewed. (E11, CI)

297-E. Cast Iron Made Straight and Uniform by New Spinning Process. *Industrial Heating,* v. 17, June 1950, p. 1066.

New centrifugal casting process using sand-lined molds. (E14, CI)

298-E. Phenolic-Sand Foundry Molds. *Modern Plastics,* v. 27, July 1950, p. 79-80, 82-83, 86, 156, 158.

Process developed in Germany during World War II and first reported in the U. S. by William W. McCulloch in Office of Technical Services, U. S. Dept. of Commerce, Report No. 1168. Essentially the method consists of producing a comparatively thin shell-like metal-casting mold by applying a mixture of sand and a phenolic binder to a hot metal pattern and curing the layer of material. It is predicted that the process will become the largest single user of phenolics. (E19)

299-E. Nodular Cast Irons. J. E. Rehder. *Canadian Metals, v.* 13, May 1950, p. 16-18, 20, 46; June 1950, p. 16-18, 21, 46-47.

Foundry techniques for producing nodular iron. Chemical composition, structure and mechanical properties as related to production practice, and compared with gray and malleable iron. Applications. (E25, CI)

300-E. Moulding and Testing Non-Ferrous Hydraulic Castings. W. Thomson. *Foundry Trade Journal,* v. 88, June 1, 1950, p. 579-585.

Investigation of various types of test-bars and experiments with a "hydraulic" mixture. (E19, EG-a)

301-E. Gases and Steel. Andrew McCance. *Foundry Trade Journal,* v. 88, June 8, 1950, p. 615-622, 625.

Edward Williams lecture describes early work and present information concerning the effects of gases on the macro and microstructure and properties of steel. Methods for determination of gas content, sources of gas, and methods of removal. 17 ref. (E25, EG-m, CI)

302-E. Tung Oil Seals Porous Castings. George J. Dull. *Iron Age,* v. 165, June 29, 1950, p. 76-78.

A wide variety of castings are being impregnated with tung oil to seal leaks due to microshrinkage and microgas porosity. Results are so reliable that pressure testing is sometimes eliminated. Methods and costs. (E25)

303-E. Mechanized Casting Methods To Meet Today's Production Needs. *Production Engineering & Management,* v. 26, July 1950, p. 60-62.

Equipment and procedures of Belle City Malleable Iron Co., Racine, Wis. (E11, CI)

304-E. Investment Castings Depend on Good Pattern Tooling. Rawson L. Wood and Davidlee Von Ludwig. *American Machinist,* v. 94, July 10, 1950, p. 97-103.

Various aspects of pattern tooling and examples of good and bad practice. (E15)

305-E. Bibliography of the Permanent Mold Process. (Concluded.) Harold E. Bourassa. *Light Metal Age,* v. 8, June 1950, p. 17-20.

Permanent-mold process for the pouring of brass, bronze, aluminum bronze, yellow brass, manganese bronze, lead and zinc alloys, mag-

nesium; slush casting in permanent molds; bearing alloys used in the permanent-mold process; vacuum permanent-mold casting process; centrifugal-casting and continuous casting in permanent molds; thermal conductivity in relation to the permanent-mold process; and refractory coatings for all types of permanent molds. (E12)

306-E. Light-Alloy Foundry and the Gas Problem. *Light Metals,* v. 13, June 1950, p. 326-331.

Chemistry, physics, and mechanics of hydrogen pick-up, methods of overcoming it as a danger, and of controlling it as an expedient. (E25, Al)

307-E. From a Metallurgist's Notebook: Impregnated Castings. H. H. Symonds. *Metal Industry,* v. 76, June 16, 1950, p. 474.

The use of resins to impregnate brass castings which show shrinkage porosity raises several problems. One of these is the effect of the plating cycle on the resin film. (E25, L17, Cu)

308-E. The "Lost Wax" Process of Precision Casting. J. S. Turnbull. *Institution of Mechanical Engineers, Proceedings,* v. 162, no. 1, 1950, p. 66-69; discussion, p. 70-74.

Previously abstracted from *Foundry Trade Journal,* item 84-E, 1950. (E15)

309-E. A Triple-Purpose Foundry; Mechanized, Semi-Mechanized and Jobbing. *Iron and Steel,* v. 23, June 1950, p. 289-294.

British ferrous foundry. (E general, CI)

310-E. Cast Crankshafts. (In Russian.) Ya. E. Gol'dshtein. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Feb. 1950, p. 10-15.

Production of low-alloy cast iron crankshafts having high mechanical properties. Stabilization of the structure and reduction of cast and structural stresses may be improved by high-temperature annealing for 2 hr. after mechanical working at 620° C. High mechanical properties of cast iron may be obtained either by reducing the total C and Si or by alloying with Mn (1.5 or 1.78%) and Ni (0.60 or 0.90%). (E25, J23, Q general, CI)

311-E. Machine Casting of Large Steel Sections. (In Russian.) A. V. Kiselev. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Feb. 1950, p. 59-61.

Equipment developed for mechanization of pouring and casting heavy cast-iron pieces weighing up to 15 tons each. (E11, CI)

312-E. Application of a Cupola With Several Rows of Tuyeres. (In Russian.) P. P. Berg and L. I. Serebrier. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Mar. 1950, p. 27-29.

Operation of cupola was experimentally investigated. Effects of various factors. Theoretical advantages of multiple-tuyere system. (E10, CI)

313-E. Die Cast Zinc on Wood. *Die Casting,* v. 8, July 1950, p. 25-26, 60.

Special technique for casting a bearing seat inside a wooden skate wheel. This produces a superior wheel with a high factor of safety. The method opens up new design possibilities for bonding die-cast metal to wood without scorching or damaging the wood. (E13, K11, Zn)

314-E. Steel Foundry Core and Molding Sands. John Howe Hall. *Foundry,* v. 78, July 1950, p. 75, 212-214.

Functions of cores, and properties and proportions of materials used in core-sand mixtures. (Fourth of series; to be continued.) (E18, CI)

315-E. Fundamentals of Feeding for Sound Tin Bronze Castings. Clyde L. Frear. *Foundry,* v. 78, July 1950, p. 76-79, 199-203.

Principles of riser design to insure adequate feeding. (Third of series; to be concluded.) (E22, Cu)

316-E. Producing Textile Machinery Castings. Pat Dwyer. *Foundry,* v. 78, July 1950, p. 84-87, 211-212.

History of the Whitin Machine Works, and its current practice in producing gray iron castings for textile machinery. (To be concluded.) (E11, T29, CI)

317-E. Basic Principles of Die Design; Ejector Mechanisms. H. K. Barton and L. C. Barton. *Machinery* (London), v. 76, June 29, 1950, p. 927-932.

Two-stage ejection for die casting machines; noncircular ejectors; sleeve ejectors; ring ejection; stripper plates; and oblique ejection. (E13)

318-E. Liquid Metal Properties; Effect on the Casting Fluidity of Alloys. V. Kondic. *Foundry Trade Journal,* v. 88, June 29, 1950, p. 691-695.

Data available which relate properties of a liquid alloy to results obtained in fluidity tests. Although different methods of fluidity measurement have been frequently used in the past, certain general and valuable relationships have been ob-

tained, irrespective of the type of test. (E25)

319-E. Roll Founding. W. G. Scott. *West of Scotland Iron and Steel Institute, Journal,* v. 56, 1948-49, p. 1-21; discussion, p. 22-26.

In the roll industry, cast rolls are termed iron or steel according to the structural state of the total carbon. Each type is considered. Details of melting, casting, and molding practice and equipment. Metallurgical aspects are emphasized. (E11, T5, CI)

320-E. Centrifugal Casting in Engine Construction. (In German.) Herbert Lüttger. *Neue Giesserei,* v. 37 (new ser., v. 3), May 4, 1950, p. 165-167.

Brief general discussion includes remarks on the strength and structural properties of centrifugally cast cylinder linings. (E14, CI)

321-E. Problems of Metallurgical Research and Their Application to Foundry Practice. (In German.) W. Oelsen. *Neue Giesserei,* v. 37, (New ser., v. 3), May 18, 1950, p. 185-189.

Solubility of oxides in iron melts and the effect of metallurgical reactions on solubility; desulfurization by means of blast-furnace slags of different basicity and their use in the cupola; principles of dephosphorization reactions, and thermodynamic treatment of constitution diagrams. (E10, N12, CI)

322-E. Pressure Casting. (In German.) F. Jentzsch. *Metall,* v. 4, June 1950, p. 218-222.

Comprehensive discussion of the process, of suitable metals and alloys, and of pressure-casting machines and molds. Principles of designing pressure-cast parts. (E13)

323-E. Aluminum Alloys for Pressure Casting. (In German.) Ziegler. *Metall,* v. 4, June 1950, p. 223-225.

Two tables state the present and the proposed standards for compositions, mechanical properties. Advantages of light-metal alloys and precautions for pressure casting. Photographs illustrate Al alloy pressure-cast parts. (E13, Al)

324-E. Magnesium Alloys as Materials for Precision Pressure-Cast Parts. (In German.) G. Lieby. *Metall,* v. 4, June 1950, p. 225-228.

A diagram illustrates the electrothermal production of Mg by reduction with carbon. Another diagram shows a pressure-casting arrangement. Comparative photographs show the superior appearance of pressure-cast Mg-Al parts over similar parts produced by other methods and from other metals. (E13, C23, Mg)

325-E. Zinc Pressure Casting. (In German.) H. Postel. *Metall,* v. 4, June 1950, p. 228-230.

Advantages of producing parts and articles by pressure casting. (E13, Zn)

326-E. Brass Pressure Casting. (In German.) G. Daase. *Metall,* v. 4, June 1950, p. 230-231.

Recommends the use of the alloy Tombasil which, because of its 4.5% Si content, is highly liquid in the molten state. (E13, Cu)

327-E. (Book) Casting of Brass and Bronze. Daniel R. Hull. 186 pages. 1950. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $3.50.

Past and present equipment, as well as procedures and problems of melting, pouring, fabricating tin bronze, molding, and mold dressing. Use of oxygen, hydrogen, and deoxidizers. (E general, Cu)

328-E. Modern Core Ovens. Charles H. Barnett. *Industrial Heating,* v. 17, July 1950, p. 1231-1236.

Importance of the core department in the economical operation of a modern foundry. Emphasis is placed on control of certain variables to permit more economical foundry operation. (E21)

329-E. An Experimental Foundry. *Bakelite Review,* v. 22, July 1950, p. 10-11.

Croning process using Bakelite phenolic resins as core binders. (E21)

330-E. Critical Factors To Watch in Investment Casting. R. L. Wood and D. Von Ludwig. *Iron Age,* v. 166, July 6, 1950, p. 88-93; July 20, 1950, p. 92-96.

Recommendations concerning die materials, tolerances, and procedures. Part 2: Melting and preparation of alloys, casting processes, removal of castings from the investment, cleaning, straightening, finishing, and inspection. (E15)

331-E. Applied Hydraulic Theory Improves Casting Technique. James A. Clark. *Iron Age,* v. 166, July 20, 1950, p. 90-91.

How control of metal pouring to conform to solidification rate has improved centrifugal casting output at Watertown Arsenal. The same process can also be applied to ingots and sand castings. For proper use, a knowledge of the basic hydraulic principles involved is outlined. (E23)

332-E. Castings Improved by the Use of Graphite Molding Material. Vladimir A. Grodsky. *Metal Progress,* v. 58, July 1950, p. 60-62.

A mixture which has the properties of a good ordinary molding sand and much higher heat conductivity. Cost is low, especially when old broken crucibles are the source of graphite. Used as a facing for sand molds, this mixture increases mechanical properties of cast metal. (E19)

333-E. World's Largest Induction Furnace for Aluminum Melting in Operation at Vanadium Corp. Plant. Manuel Tama. *Industrial Heating,* v. 17, July 1950, p. 1150-1152, 1154, 1156, 1272.

Includes description of electromagnetic pump for molten metal. (E10, Al)

334-E. Mineral Perlite—Foundry Uses. E. D. Boyle. *American Foundryman,* v. 18, July 1950, p. 25-26.

Recent investigations at the Puget Sound Naval Shipyard in the use of sand additives for improving insulating properties of molding sands and cores indicate that perlite can be used to reduce speed of solidification of molten metal and to eliminate expansion-type casting defects. (E18)

335-E. Modern Foundry Methods: Naval Research Project Develops Unusual Foundry Techniques. *American Foundryman,* v. 18, July 1950, p. 34-38.

Research for U. S. Navy by Alloy Engineering & Casting Co., Champaign, Ill., has resulted in development of radically different methods for producing castings, new mold atmospheres and melt degassing, ceramic-faced sand cores; ceramic and ceramic-graphite molds; continuous temperature and solidification control in the mold through induction heating and brine cooling; and a dielectric heater with variable voltage output automatically adjusted to varying loss factors. Two of the casting processes and some of their related operations. (E general)

336-E. A.F.S. Foundry Glossary: Defines Useful Foundry Terms. *American Foundryman,* v. 18, July 1950, p. 40-41, 92-94.

First installment covers abrasion to bridging. (E general, A10)

337-E. Burning-In the Cupola Bed. B. P. Mulcahy. *American Foundryman,* v. 18, July 1950, p. 42-45.

See abstract of "The Cupola—Its Raw Materials and Operation", *Foundry,* item 89-E, 1950. (E10, CI)

338-E. Precision Aluminum Castings. Hiram Brown. *American Foundryman,* v. 18, July 1950, p. 50-57.

The various factors involved in production of "precision" or high-quality Al castings. Recommended practices involved in obtaining high-quality metal. Sand, permanent-mold, die, plaster, investment, and centrifugal casting. Emphasizes mold materials and rigging practice. (E general, Al)

339-E. Establish Foundry Controls Through Laboratory Services. *American Foundryman,* v. 18, July 1950, p. 58-60.

Need for more use of chemical analysis, for checking coke charges, and for analysis of incoming materials. (E general, S11)

340-E. Precision Casting Grows Up. *Modern Industry,* v. 20, July 15, 1950, p. 93.

Uses by Allis-Chalmers, National Bronze & Aluminum Foundry Co., and American Brake Shoe. (E15)

341-E. Trends in Methods of Melting and Casting for High Conductivity Copper Wire Bars. R. H. Bauld. *Institution of Mining and Metallurgy.* "The Refining of Non-Ferrous Metals—A Symposium", 1950, p. 185-202; discussion, p. 227-244.

Previously abstracted from Preprint No. 7, July 1949. See item 14C-65, 1949. (E10, Cu)

342-E. Gases and Steel. Andrew McCance. *Engineering,* v. 169, June 30, 1950, p. 737-739. (A condensation.)

Previously abstracted from *Foundry Trade Journal.* See item 301-E, 1950. (E25, EG-m, CI)

343-E. Non-Ferrous Investment Casting. Hiram Brown. *Institute of British Foundrymen,* Paper No. 966, 1950, 16 pages. (Advance Copy).

Wax and plastic pattern making, investment materials and preparation, drying, gating, melting, pouring, and metallurgical considerations. Data for various Al alloys. (E15, Al)

344-E. Some Experiments in Sand Casting of Conductivity Copper. W. H. Glaisher. *Institute of British Foundrymen,* Paper No. 968, 1950, 4 pages (Advance Copy); also *Foundry Trade Journal,* v. 89, July 6, 1950, p. 3-6; discussion, p. 6.

Effects of various degassing and deoxidation treatments on the physical and mechanical properties of sand-cast test bars made from melts of electrolytic copper melted under charcoal covers. (E11, Cu)

345-E. Fluidity of Steel. J. E. Worthington. *Institute of British Foundrymen,* Paper 971, 1950, 7 pages (Advance Copy).

A method of standardizing pouring speed and some results. The way in which fluidity varies with different carbon contents; Fluidity

of some alloy steels. 16 ref. (E25, ST)

346-E. Review of the South African Foundry Industry. H. G. Goyns. *Institute of British Foundrymen,* Paper No. 974, 1950, 9 pages (Advance Copy).

Extent and scope of the industry, making comparisons with foundries in other countries. Extent of the local market, types and number of foundries, tonnages involved, types of castings, plant and laboratory facilities, raw materials, sands, clays, refractories, design and feeding technique, costing and estimating, personnel, and welfare. Deals for the most part with iron and steel. (E general, A4, CI)

347-E. Rationalisation of Sand Preparation. J. F. Goffart. *Institute of British Foundrymen,* Paper No. 975, 1950, 9 pages (Advance Copy).

A suitable and rationally designed sand-handling plant. Reclamation; molding sands; granular structure; agglomerating and bonding agents; sand characteristics; various sand mills and their choice; and sand preparation, wetting, storage, and regeneration. (E18)

348-E. Loam and Dry-Sand Moulding in the Jobbing Foundry. D. Redfern. *Foundry Trade Journal,* v. 89, July 13, 1950, p. 37-43.

Typical heavy jobbing shop, where castings ranging from 2 to 40 tons in weight are produced, with the average weighing 3-15 tons. (E19, CI)

349-E. Research on Short Cycle Cast Irons. (In Japanese.) Nobuhisa Tsutsumi. *Journal of the Casting Institute of Japan,* v. 21, no. 1, 1949, p. 2-9.

Use of a metal mold shortens the malleabilizing cycle considerably. By use of a metal mold and a sand core, a pipe union having the structure of blackheart malleable iron, temper carbon, and ferrite ground, was produced by only 5-6 hr. annealing. (E19, J23, CI)

350-E. Effect of Impurities in Zinc Alloys on Their Castability. I. (In Japanese.) Tetsutaro Mitsuhashi, Kazuo Katori, Manabu Ueno, and Kingo Naoki. *Journal of the Casting Institute of Japan,* v. 21, no. 2, 1949, p. 2-10.

Effect of Pb was studied for the Zamak alloy series. It was found to be a very objectionable impurity. Small percentages can be neutralized by use of Mg. (E25, Zn)

351-E. Cupola Operation Using Poor Quality Coke. I. The Tuyere. (In Japanese.) Shigeo Shibuya. *Journal of the Casting Institute of Japan,* v. 21, no. 2, 1949, p. 11-20.

Tuyere design was studied in connection with use of poor coke. Experiments were conducted using a small cupola. (E10, CI)

352-E. Some Experiments on Use of Facing Sand in Green-Sand Molds for Spinning-Machine Parts. I. (In Japanese.) Umeharu Harada. *Journal of the Casting Institute of Japan,* v. 21, no. 4, 1949, p. 2-18.

Effects of moisture, grain size of facing sand, clay or bentonite binder, and addition of powdered graphite, coal dust or coke dust to facing sand, on the surface condition of the castings. Addition of some kinds of powdered carbon to facing sand having a moderate grain size and suitable moisture content is helpful in obtaining castings having a better surface condition. (E18, CI)

353-E. Utilizing Oxygen in Cupola Operation. (In Japanese.) S. Honda and K. Saito. *Journal of the Casting Institute of Japan,* v. 21, no. 4, 1949, p. 19-22.

Improved design arrangements for the above. Recommends intermittent use of O_2 for high-carbon cast iron and continuous injection for low-carbon irons. (E10, CI)

354-E. Cupola-Furnace Melting of Bronze. (In Japanese.) Masaji Itoh. *Journal of the Casting Institute of Japan,* v. 21, no. 5, 1949, p. 2-7.

Cupola furnace was adopted because of the shortage of graphite crucibles. It was found that cupola melting of bronze was satisfactory even when poor quality coke was used, but that melting loss was comparatively large. (E10, Cu)

355-E. Method of Casting Spinning-Machine or Loom Parts. I-II. (In Japanese.) H. Horiguchi. *Journal of the Casting Institute of Japan,* v. 21, no. 5, 1949, p. 8-19; no. 6, 1949, p. 1-8.

Part I. Various facing materials and their effects on surface conditions and blowhole formation in castings. Part II: Defects caused by warpage or moisture in the sand mold. Recommendations for pattern design and other procedures to minimize these defects. (E19, CI)

356-E. Some Notes on Gas Holes in Iron Castings Cast in Green Sand Molds. (In Japanese.) T. Kinoshita and M. Ogata. *Journal of the Casting Institute of Japan,* v. 21, no. 6, 1949, p. 8-13.

Experimental work conducted to minimize gas holes. Following conditions are recommended: Sand moisture less than 9%; sand permeability of 100 (AFS units); pouring temperature above 1300° C. (E19, CI)

357-E. Short-Cut Method for Determining Clay Content of Molding Sands. (In Japanese.) Taiji Yasuda and Etsuro Sekido. *Journal of the Casting Institute of Japan,* v. 21, no. 9, 1949, p. 1-5.

Experiments on the specific-gravity method. (E18)

358-E. Abrasion-Strength Testing Machine for Molding Sand. (In Japanese.) Unokiti Ouchi. *Journal of the Casting Institute of Japan,* v. 21, no. 9, 1949, p. 5-10.

The machine, method of operation, and typical results. (E18)

359-E. Foundry Practice for Large Pressure-Tight Copper Alloy Castings. (In Japanese.) Eizo Sumiyoshi and Saburo Koyasu. *Journal of the Casting Institute of Japan,* v. 21, no. 9, 1949, p. 10-14.

Recommended procedures and equipment for production of Cu alloy castings 120-295 kg. in weight, 10-20 mm. thick, and requiring absolute tightness against gas pressures of 7 kg. per sq. cm. (E11, Cu)

360-E. Studies on Sand Particles of Casting Sands. I. (In Japanese.) M. Lizumi. *Journal of the Casting Institute of Japan,* v. 21, no. 10, 1949, p. 1-5.

Effects of grain shape, size and distribution on properties of sand molds. Effects of the space between the grains. The maximum dimensions of these voids required to prevent intrusion of molten metal into the space between the grains. (E18, CI)

361-E. Research on the Semi-Permanent Mold. I. The Graphite Base Mold. (In Japanese.) Motoo Sumitomo and Shiro Terai. *Journal of the Casting Institute of Japan,* v. 21, no. 10, 1949, p. 6-12.

Nature of the graphite base mold, using sodium silicate and bentonite as binder, was studied. From the standpoints of green and dry strength, dry shrinkage, heat conductivity, and durability of the mold, the best result is obtained with a composition containing 10% bentonite, 18% Na_2SiO_3, and remainder graphite powder. (E19)

362-E. Studies of Gases Evolved on Solidification of Molten Cast Irons. I and II. (In Japanese.) Minao Nakano. *Journal of the Casting Institute of Japan,* v. 21, no. 10, 1949, p. 12-17; v. 22, no. 3, 1950, p. 7-12.

Results of study using an Orsat apparatus. Effects of changes in melting conditions, addition agents, and operating conditions. (E25, CI)

363-E. Research on Molding Sand Binders. II. (In Japanese.) T. Makiguchi. **Journal of the Casting Institute of Japan,** v. 21, no. 11, 1949, p. 1-5.

In order to determine the effects of chemical properties of molding sand binders on casting surface conditions, the strength of molds using many kinds of dry binders at elevated temperatures was investigated. Stability of sand grains on the mold surface depending upon kind of binder, was also examined. It appears that the less the difference between strength in the coagulated and sintered states, and the greater the strength of the sand grains, the better the properties of the binders. (E18)

364-E. Drying of Molds. 1. Drying Mechanism. (In Japanese.) Kenji Chijiiwa. *Journal of the Casting Institute of Japan,* v. 21, no. 11, 1949, p. 12-18.

In order to explain the above mechanism, rate of drying and temperature gradient were studied. Effects of air velocity, temperature, water content, etc., were determined. (E19)

365-E. Apparatus for Handy Measurement of Moisture in Molding Sand. (In Japanese.) Tadao Sato and Hideo Teramura. *Journal of the Casting Institute of Japan,* v. 21, no. 12, 1949, p. 1-5.

Apparatus measures change in electrical capacity by use of low-frequency resonanced current. (E18)

366-E. Decreasing the Sulfur Content by the Hot-Blast Cupola. (In Japanese.) Toshihiro Kinoshita and Masuo Nakashima. *Journal of the Casting Institute of Japan,* v. 22, no. 2, 1950, p. 16-26.

Results of experiments on refining iron for sulfur reduction in the hot-blast cupola. Reasons for the sulfur reduction. (E10)

367-E. Study of a New Cupola With Multiple Rows of Tuyeres. (In Japanese.) M. Hamasumi and T. Sugiura. *Journal of the Casting Institute of Japan,* v. 22, no. 3, 1950, p. 1-7.

Experiments with a new cupola having four rows of tuyeres, each consisting of four tuyeres. Capacity is increased by 50% over the normal cupola, in spite of use of poor coke containing 20-25% ash. The cupola was operated with two types of blowers: a turbo-fan of 30 cu.m. per min. capacity and pressure of 250 mm. H_2O; and a Roots blower of 45 cu.m. per min. Capacity and pressure of 550 min. H_2O. Use of the higher pressure was advantageous. The new cupola proved more effective than use of oxygen and of lime-treated coke. (E10, CI)

368-E. Research on Green Molding

Sands—Especially on "Buckling Defects". (In Japanese.) M. Tanji and U. Ouchi. *Journal of the Casting Institute of Japan*, v. 22, no. 3, 1950, p. 13-17.

Many defects which appear on the surfaces of castings are dependent on the expansion properties of sands upon sudden heating. Simple testing method for such defects, easily operated as a control procedure. (E18)

369-E. Studies on "Camlachie Cramp", Especially on Chaplets. (In Japanese.) T. Muraki. *Journal of the Casting Institute of Japan*, v. 21, no. 11, 1949, p. 5-12.

On the basis of the English abstract, the article is believed to deal with coatings on chaplets and their effects on heat transmission and structure at the fusion zone. The term "camlachie cramp" remains obscure. Heat-transmission effects were not investigated. Steel chaplets coated either by plating of scale formation were tested by pouring molten cast iron around them. Micro and macrostructures at the fusion zone are illustrated. (E19, CI)

370-E. Use of Chills in Producing Tin Bronze Castings. Clyde L. Frear. *Foundry*, v. 78, Aug. 1950, p. 76-77, 182-189.

Recommended practice in use of chills, chaplets, and antichills. Fourth and final article of series on the influence of various factors during the solidification of tin-bronze castings. (E25, Cu)

371-E. Producing Textile Machinery Castings. (Concluded.) Pat Dwyer. *Foundry*, v. 78, Aug. 1950, p. 78-81, 190-192.

Procedures and equipment for sand casting of iron parts in the foundry department of Whitin Machine Works. Includes cupola practice. (E11, E10, CI)

372-E. Plastic Bonded Shell Molds Used in New Casting Process. Bernard M. Ames, Seymour B. Donner, and Noah A. Kahn. *Foundry*, v. 78, Aug. 1950, p. 92-96, 206-217.

Basic fundamentals of the Croning or "C" process. Results of investigation of the applicability of heat-polymerized plastics as molding-sand binders for casting nonferrous or ferrous metals. (E19)

373-E. Origin and Control of Carbon in Ferrous Alloys. Harry A. Schwartz. *Foundry*, v. 78, Aug. 1950, p. 97, 135-136, 138-139. Reprinted from "Foundry Science", Pitman Publishing Corp., 1950.

The Fe-O-C equilibrium diagram and equilibria of the various phases involved. Application to melting practice in the cupola, reverberatory furnace, converter, etc. (E10, N8, Fe)

374-E. Mechanizes Production of Textile Machinery Castings. *Foundry*, v. 78, Aug. 1950, p. 146-147.

Equipment of Draper Corp.'s Hopedale, Mass., gray-iron foundry. (E11, T29, CI)

375-E. The Croning Process. *Foundry*, v. 78, Aug. 1950, p. 170-171.

Principal steps in production of castings by the so-called Croning or "C" process as demonstrated by Bakelite Division, Union Carbide & Carbon Corp. (E19)

376-E. Detroit Spending Millions on Foundry Process. Walter Patton. *Iron Age*, v. 166, Aug. 3, 1950, p. 89-90.

Research now under way in the automobile industry on the Croning resin-sand process, which was imported from Germany in 1947. Procedure and revolutionary importance of process in which auto makers are believed to have already invested $2 million. It may be used for precision casting of gray iron, steel, and aluminum. (E19, CI, Al)

377-E. New Process Casts Assembled Products. *Production Engineering & Management*, v. 26, Aug. 1950, p. 66.

Process developed by Gries Reproducer Corp. makes it possible to die cast two or interlinked movable elements in one operation. Examples are chains and scissors. Details are not given. (E13)

378-E. Water-Cooled Engine Block Gravity Die Cast. *Steel*, v. 127, Aug. 7, 1950, p. 86-87, 108.

Equipment and procedures for permanent-mold casting of complex twin-cylinder, water-cooled, aluminum engine. (E12, T21, Al)

379-E. Feature of Iron and Steel Foundry Is Flexibility. *Canadian Metals*, v. 13, July 1950, p. 20-23.

Foundry of Dominion Engineering Works, Lachine, Quebec. (E11, CI)

380-E. Refractories in the Foundry. W. F. Ford and J. R. Rait. *Refractories Journal*, v. 26, July 1950, p. 272-280.

Previously abstracted from *Foundry Trade Journal*, item 264-E, 1950. (E10)

381-E. Review of the South African Foundry Industry. H. G. Goyns. *Refractories Journal*, v. 26, July 1950, p. 283-287.

Extent and scope of the South African foundry industry, and comparisons with foundries in other countries. (E general)

382-E. The Use of Alloying Elements in Chilled Iron Rolls. Archibald

Allison. *Metallurgia,* v. 42, June 1950, p. 9-13; July 1950, p. 63-66.

Practical and fundamental aspects of the manufacture of chilled iron rolls. Effects of alloying elements, preparing the charge, heat treatment, and casting. Second installment deals mainly with sampling for analysis and with microstructure of various compositions following various treatments. (E11, T5, CI)

383-E. Basic Principles of Die Design; Cores and Core Mechanisms. H. K. Barton and L. C. Barton. *Machinery* (London), v. 77, July 27, 1950, p. 113-120.

Design of dies for die casting. (E13)

384-E. Strickling a Five-Ton Cylinder Liner. S. Wade. *Foundry Trade Journal,* v. 89, July 20, 1950, p. 72-73.

Describes procedure. (E19)

385-E. Core Blowing in a Mechanised Foundry. S. Lane. *Foundry Trade Journal,* v. 89, July 20, 1950, p. 74.

Procedure. (E21)

386-E. Fluidity of Steel. J. E. Worthington. *Foundry Trade Journal,* v. 89, July 27, 1950, p. 87-93.

Previously abstracted from *Institute of British Foundrymen,* Paper 971, 1950. See item 345-E, 1950. (E25, ST)

387-E. Castings for Ships and Road Vehicles. A. G. Thomson. *Foundry Trade Journal,* v. 89, July 27, 1950, p. 103-106.

Sand casting of large parts in iron and nonferrous materials, by a British firm. (E11, T21, T22)

388-E. The Production of Refined-Copper Shapes. R. H. Waddington. *Institute of Metals,* "Symposium on Metallurgical Aspects of Non-Ferrous Metal Melting and Casting of Ingots for Working", 1950, p. 33-46.

Previously abstracted from *Journal of the Institute of Metals,* item 14C-14, 1949. (E10, C23, Cu)

389-E. The Application of Flux Degassing to Commercially Cast Phosphor Bronze. N. I. Bond-Williams. *Institute of Metals,* "Symposium on Metallurgical Aspects of Non-Ferrous Metal Melting and Casting of Ingots for Working", 1950, p. 61-74.

Previously abstracted from *Journal of the Institute of Metals,* item 14C-16, 1949. (E25, C5, C21, Cu)

390-E. Production in Converters, Characteristics, and Fields of Application of FAH Cast Irons. (In French.) M. Mallevialle. *Revue de Métallurgie,* v. 47, June 1950, p. 465-471; discussion, p. 471.

Method of production of different types of FAH cast irons (synthetic cast irons obtained by recarburization of molten steel in a Thomas converter). Each type of cast iron is comprehensively analyzed; its physical and chemical properties, and fields of application. Photomicrographs indicate the crystal structure of each individual type. (E11, M27, CI)

391-E. Design and Thermotechnical Problems of the Hot Blast Cupola. (In German.) Otto Günthner. *Neue Giesserei,* v. 37, (new ser., v. 3), June 1, 1950, p. 205-209.

The principles of hot-blast melting. Design of hot-blast cupolas, the blast heater in operation, control instruments, operation and cleaning, and results obtained. Results from different plants are compared and critically analyzed. Suggestions for improvements. (E10, CI)

392-E. Determining Ladle Contents While Pouring. (In German.) P. Sahmel and H. Pieper. *Neue Giesserei,* v. 37 (new ser., v. 3), June 1, 1950, p. 211-213.

Explains a method of calculating the amount of material remaining in the ladle from its angle of inclination. Graphs permit quick estimation of this amount. (E23)

393-E. Application of the Constitution Diagram of the Iron-Carbon-Silicon System in the Foundry. (In German.) K. Mühlbradt. *Neue Giesserei,* v. 37 (new ser., v. 3), June 1, 1950, p. 213-215.

The problems of melting machine-cast iron and the effects of Si addition to counteract a deficiency of carbon. (E25, CI)

394-E. A New Measuring Unit Used in Testing of Molding Sand. (In German.) W. Reitmeister. *Neue Giesserei,* v. 37 (new ser., v. 3), June 15, 1950, p. 225-231.

Proposes the use of the term "Specific Mold Volume" which is defined as the absolute mold volume divided by the absolute weight of a given dry or green sand. Experiments show a positive correlation between specific mold volume and gas permeability. Development of a standard for measuring sand grain sizes. (E18)

395-E. An Interesting Slag-Iron Reaction in the Mold. (In German.) F. Roll. *Neue Giesserei,* v. 37 (new ser., v. 3), June 15, 1950, p. 233.

Show how molten iron in the mold absorbed sulfur from a lump of slag. (E19, B21. Fe)

396-E. Surface Smoothness of Parts Cast in Metal Molds. (In Russian.) A. S. Smirnov. *Stanki i Instrument* (Ma-

chine Tools and Equipment), v. 21, Apr. 1950, p. 21.
Applied to the casting of steel. (E12, CI)

397-E. Introduction of Modified Cast Iron in Peat-Industry Machinery. (In Russian.) B. G. Grinberg. *Torfyanaya Promyshlennost* (Peat Industry), v. 27, Apr. 1950, p. 23-25.
Recommends modification of cast iron for construction of peat machines as the most economical and practical method of obtaining high-strength cast-iron parts. Method of modification. Physical properties of the material. (E11, T28, CI)

398-E. A Modern Iron Foundry. *Mining Magazine,* v. 82, Feb. 1950, p. 76-80.
New British foundry.
(E general, CI)

399-E. Increased Activity Marks 1950 Apprentice Contest. Roy W. Schroeder. *American Foundryman,* v. 18, Aug. 1950, p. 28-31.
Prize-winning entries in steel and nonferrous divisions. (E general, A3)

400-E. Develop Gating Formula for Aluminum Alloy Castings. Alfred J. Howarth. *American Foundryman,* v. 18, Aug. 1950, p. 32-36.
Functions of gating systems. No exact formula for gating various types of castings has as yet been devised. The "formula" described consists merely of approximate dimensional rules for size of gate, number of gates, gate location, runner and sprue, cross-sections, chokes, screens, pouring time, and risers. Results of application of the rules to a specific example. (E22, Al)

401-E. Silica Sands—Sieve Analyses. A. I. Krynitsky and F. W. Raring. *American Foundryman,* v. 18, Aug. 1950, p. 40-43.
A study of sieve analyses of silica sand was undertaken to determine the precision of the AFS fineness test for foundry sands. Primary purpose was to determine whether the type of sieve shaker used has any significant effect on analytical results for a given sample, and reproducibility of a sampling technique. Vibratory and rotary sieve shakers give approximately the same results with the same set of sieves. (E18)

402-E. Modern Foundry Methods: Model Laboratory Provides Sand, Metal Research and Control. *American Foundryman,* v. 18, Aug. 1950, p. 44-45.
New development and control laboratory of U. S. Graphite Co., which contains complete facilities for studying foundry sands and refractories, mold and core washes, and their influence on castings. (E18)

403-E. Metallurgy of Iron Base Rolls. F. E. Sutherland. *American Foundryman,* v. 18, Aug. 1950, p. 46-51.
Depth of hardened layer, fundamental chemistry of chilled iron (effects of C, Si, Mn, S, P, Mo, Ni and Cr), metallurgy of chilled and grain-type rolls, running a heat, and effect of granular graphite additions. (E25, CI)

404-E. Discusses Core Oil Evaluation and Offers Data on Core Gas. Hiram Brown. *American Foundryman,* v. 18, Aug. 1950, p. 52-53.
Discusses "Core Oil Evaluation Method" by R. H. Olmsted (June 1950 issue, item 290-E, 1950). Core-gas test equipment and data on properties of a variety of core binders. (E21)

405-E. A.F.S. Foundry Glossary Defines Useful Foundry Terms. Part II. (Continued.) *American Foundryman,* v. 18. Aug. 1950, p. 54, 80-81, 85-91.
Covers "Brinell hardness" to "hearth". (To be continued.)
(E general, A10)

406-E. Metal Parts With High Accuracy and Finish Produced by New Casting Process. B. N. Ames, S. B. Donner, and N. A. Kahn. *Materials & Methods,* v. 32, Aug. 1950, p. 43-46.
See abstract of "Plastic Bonded Shell Molds Used in New Casting Process", *Foundry,* item 372-E, 1950. (E19)

407-E. Precision Investment Steel Casting Alloys. *Materials & Methods,* v. 32, Aug. 1950, p. 77, 79.
Heat treatments, physical and mechanical properties, and general characteristics for 15 alloy, 18 tool, and 10 stainless steels.
(E15, Q general, P general, J general, ST)

408-E. 22% Nickel Silver Precision Cast in Plaster Molds. *Nickel Topics,* v. 3, Aug. 1950, p. 5.
The process and a typical application. (E15, Cu)

409-E. Steelworks Castings. L. H. Williams. *Foundry Trade Journal,* v. 89, Aug. 3, 1950, p. 125-130.
British foundry for heavy steel castings. (E11, CI)

410-E. (Book) **Casting Design as Influenced by Foundry Practice.** Oliver Smalley. 62 pages. 1950. Meehanite Metal Corp., New Rochelle, New York.
General design rules, pattern making, molding and core making, gating, risering, and material selection. Also welding, hard surfacing, coating, and finishing of castings.
(E general)

411-E. Three Furnaces Teem 50-Ton Casting. *Iron Age,* v. 166, Aug. 24, 1950, p. 78.

Procedure for casting steel part for a hydro-electric turbine at Falk Corp., Milwaukee. (E23, CI)

412-E. Moulding Sands. *Foundry Trade Journal;* v. 89, Aug. 10, 1950, p. 141.

Compares extent of bonding of British sands to those used in other parts of the world. Discusses whether molding machines should be made to match sands or sands compounded to suit the machine. (E18)

413-E. Castings for Contractors' Plant. A. Graham Thomson. *Foundry Trade Journal,* v. 89, Aug. 10, 1950, p. 143-147.

Foundry layout, exacting tests, types of castings, melting plant, sand system, core shop, patternshop, quality control, personnel, and working conditions at Winget, Ltd., Rochester, England. All castings are produced in Meehanite iron. (E11, CI)

414-E. Investment Casting; The Importance of Correct Design. T. F. Frangos. *Metal Industry,* v. 77, Aug. 11, 1950, p. 83-84, 86.

General discussion. (E15)

415-E. 24 Ways To Avoid Trouble in Die Casting Design. Part One. Hiram K. Barton. *Die Castings,* v. 8, Sept 1950, p. 24-26, 58.

Diagrams. (To be continued.) (E13)

416-E. Special-Purpose Units To Produce Purse Frame Die Castings. E. I. Valyi. *Die Castings,* v. 8, Sept. 1950, p. 28-30.

Zn alloy rivets and knobs are used. (E13, Zn)

417-E. That Porosity Problem. *Die Castings,* v. 8, Sept. 1950, p. 36-38.

How use of a Zn die casting instead of a precision bronze casting for the valve body in the solenoid-operated air valve used in resistance welders resulted in 60% reduction in machining costs; 84% reduction in cost of materials; 100% increase in life of the air valve; and an airtight, non-warping, and non-shrinking casting. (E13, T7, Zn)

418-E. A Method for Studying Mold-Metal Interface Reactions. Robert E. Savage and Howard F. Taylor. *Foundry,* v. 78, Sept. 1950, p. 82-89.

A method in which a steel pin is melted while embedded in a standard sand test specimen. The method is said to reproduce actual operating conditions and permits determination of the effect of numerous variations in sand mixtures and metal composition. Apparatus and test results. Data for Armco iron and several carbon steels. (E21, Fe, CI)

419-E. Diesel Engine Crankshafts Cast in Gray Iron. Alexander Finlayson. *Foundry,* v. 78, Aug. 1950, p. 70-75, 150-152, 154; Sept. 1950, p. 92-97, 216-218, 220.

Foundry practice of Pacific Car & Foundry Co. in producing cast crankshafts weighing 500-5000 lb. and 6018 ft. long. (E11, T25, CI)

420-E. Navy Modernizes Foundry. Edwin Bremer. *Foundry,* v. 78, Sept. 1950, p. 98-101.

Modernization of the steel foundry of the Naval Gun Factory, Washington. (E general, CI)

421-E. The Pressurized Cupola. *Foundry,* v. 78, Sept. 1950, p. 127.

A windbox equipped with a circular orifice ring designed to solve the problem of uniform distribution of air through the cupola charge. (E10)

422-E. Tin Segregation in Bronzes. Walter Chretien-Horand. *Foundry,* v. 78, Sept. 1950, p. 136.

Solidification and calculation of percentage of melt and crystals at 792° C. for various compositions. Practical application. (E25, Cu)

423-E. Aluminum Core Boxes Better and Cheaper. Franz Schumacher. *Iron Age,* v. 166, Sept. 7, 1950, p. 104-105.

Claims that accurate Al core boxes can now be produced at lower cost than those made of wood. By this new method, foundries can greatly reduce overall coremaking costs, storage, and handling. (E21, T5, Al)

424-E. Surface Finish of Zinc-Base Diecastings. R. L. Wilcox. *Plating,* v. 37, Sept. 1950, p. 934-937, 953.

Information originally prepared as a manual for instruction and guidance of die-casting machine operators. Factors influencing the production of sound die castings with good surface finish. (E13, Zn)

425-E. The Croning Process. *Western Machinery and Steel World,* v. 41, Aug. 1950, p. 62-63.

New process for producing foundry mold and cores using a Bakelite phenolic resin-binder. (E18)

426-E. Casting Accurate Production Bronze. James Corcoran. *Western Machinery and Steel World,* v. 41, Aug. 1950, p. 74-75.

Production of brass and bronze castings at Acra-Cast Foundries in Southern California. (E11, Cu)

427-E. Magnesium Foundry Practice in Canada. M. W. Martinson and

J. W. Meier. *Canadian Metals,* v. 13, Aug. 1950, p. 10-13, 40-42, 50.

Previously abstracted from *American Foundrymen's Society,* Preprint 50-44, 1950. See item 195-E, 1950. (E general, Mg)

428-E. High Standards in Mass Production Foundry. G. L. White. *Canadian Metals,* v. 13, Aug. 1950, p. 16-19, 47.

Ferrous foundry of Massey-Harris Co., Canada. (E general, CI)

429-E. The Casting of Metals in Permanent Molds. G. G. M. Carr-Harris. *Canadian Metals,* v. 13, Aug. 1950, p. 26, 28-29, 44-46.

Reviews the process; includes bibliography. 49 ref. (E12)

430-E. Steel Casting Production; A Survey of the Methods Employed by Leyland Motors, Ltd. *Automobile Engineer,* v. 40, Aug. 1950, p. 278-280. (E general, CI)

431-E. The Staveley Iron and Chemical Co., Ltd. *Iron and Steel,* v. 23, Aug. 1950, p. 349-351.

Plant includes centrifugal casting, sand casting, blast furnaces, coke ovens, etc. (E11, E14, D1)

432-E. A Modern Foundry; The Penistone Works of the David Brown Foundries Company. *Metal Industry,* v. 77, Aug. 18, 1950, p. 99-101.

Equipment and procedures of British foundry for ferrous and nonferrous work. (E general)

433-E. Internal Porosity in Grey Cast Iron. A. A. Timmins. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Aug. 1950, p. 449-463; discussion, p. 476-498.

Shrinkage defects were studied for a wide range of metal compositions. (E25, CI)

434-E. Solid Contraction and Fluid Shrinkage in Cast Iron With Special Reference to Heavy Castings. E. Longden. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Aug. 1950, p. 465-475; discussion, p. 476-498.

Material contributing to a fuller understanding of the steps necessary to control the incidence of fluid shrinkage and solid contraction in iron castings is selected from previous papers. Specific examples. (E25, CI)

435-E. Air-Setting Core Paste. *Foundry Trade Journal,* v. 89, Aug. 17, 1950, p. 173-174.

Experiments with several mixes which resulted in selection of a paste containing 57% of a proprietary clay and 43% commercial sodium silicate. Good results were obtained in the laboratory and in practice. (E21)

436-E. Casting Fluidity of Metals. *Foundry Trade Journal,* v. 89, Aug. 17, 1950, p. 175-178.

Joint discussion of "The Fluidity of Steel", J. E. Worthington; and "Effect of Liquid-Metal Properties on the Casting Fluidity of Alloys", V. Kondic. See items 386-E and 318-E, 1950. (E25)

437-E. Aluminium-Alloy Castings. *Foundry Trade Journal,* v. 89, Aug. 24, 1950, p. 201-205. Based upon "Aluminium-Alloy Castings—A Review of British Achievement" by Frank Hudson.

Emphasizes the value of "Y" alloy (4% Cu, 2% Ni, 1.5% Mg, rest Al) for internal-combustion-engine pistons and other engineering components operated at elevated temperatures. (E general, Al)

438-E. The "Abreuvage" Defect. *Foundry Trade Journal,* v. 89, Aug. 24, 1950, p. 215-216. Based on article in *Journal d'Information Techniques des Industries de la Fonderie.*

"Abreuvage" is defined as penetration of the metal by capillary action into the spaces between the grains of sand in the core. It can be due to physical causes, more or less connected with refractoriness, or mechanical causes. Causes and their remedies. (E21)

439-E. Carbon Control of Cupola-Melted Irons. E. Bramble. *Foundry Trade Journal,* v. 89, Aug. 24, 1950, p. 217-218.

Principal factors affecting carbon constant. Recommendations. (E10, CI)

440-E. Production of Impermeable Pieces of Cast Iron. (In French.) Etienne Doat. *Fonderie,* May 1950, p. 2056-2058.

Investigated particularly for gas containers under high pressure. Factors involved, such as composition, method of casting, conditions of cooling, type of mold, etc. (E11, T26, CI)

441-E. Refining of A-S 13 Alloy (Alpax). (In French.) Jean Duport and Gustave Caminade. *Fonderie,* June 1950, p. 2094-2097.

Methods and technique for refining the above Al alloy (13% Si). Comparative data and micrographs. (E25, Al)

442-E. Crystallization of Cast Iron With Nodular Graphite. (In Russian.) K. P. Bunin and G. I. Ivantsov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 72, June 21, 1950, p. 1051-1053.

Investigated for cast iron contain-

ing 3.5-3.7% C and 2.2-2.5% Si, modified by an electronic method described by Mil'man (*Vestnik Mashinostroeniya,* No. 12, 1949). Factors influencing the formation of nodular graphite—in particular, Si content. (E25, CI)

443-E. Surface Quality of Zinc Die Castings. James L. Erickson. *Metal Finishing,* v. 47, May 1949, p. 72-74.

Defects which lead to premature corrosion of the plated parts (automotive hardware.) Recommendations for proper selection and use of die lubricants. 14 ref. (E13, L17, Zn)

444-E. A Laboratory Arc-Furnace for Melting Alloys Containing the Refractory Transition Metals. G. A. Geach and D. Summers-Smith. *Metallurgia,* v. 42, Aug. 1950, p. 153-156.

Reviews literature on such furnaces. Furnace developed in laboratories of Associated Electrical Industries in England. 11 ref. (E10, EG-d)

445-E. Basic Principles of Die Design; Cores and Core Mechanisms. H. K. Barton and L. C. Barton. *Machinery* (London), v. 77, Aug. 31, 1950, p. 268-274.

Refers to die-casting dies. 18 schematic diagrams. (E13)

446-E. The "Metallurgical Blast Cupola". Robert Doat. *Foundry Trade Journal,* v. 89, Aug. 31, 1950, p. 229-232; discussion, p. 227. Translated from paper presented to Italian Metallurgical Association.

Installation in use by Compagnie Générale des Conduites d'Eau, Liege, Belgium, for production of cast iron from small steel scrap. This cupola, which includes a dust collector and recuperators, is capable of refining the charge to produce practically any iron desired. It differs greatly from the ordinary cupola in that refining, as well as melting, takes place. Operating data are charted. (E10, CI)

447-E. (Book) **Foundry Sand Control.** W. Davies. United Steel Companies, Ltd., 17 Westbourne Rd., Sheffield 10, England. 30s. plus postage.

The nature of silica and the clays. Approach from the standpoint of the geologist. Strength of molding sands, the mold surface, the foundry-sand system, selection of foundry sands, selection of bonding clays, and the future of foundry control. (E18)

448-E. (Book) **Handbook on Designing for Quantity Production. Ed. 2.** Herbert Chase. 564 pages. McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. $7.50.

Substantially rewritten, with a considerable amount of new material added. Design of die castings, sand castings, permanent-mold castings, screw-machine products, stampings, impact extrusions, die-forged parts, hot heading, cold heading, wire forms, powder-metal parts, and plastic moldings. Merits of the various processes from the standpoints of cost and productivity. (E general, F general, G general, H general)

449-E. Nodular Cast Iron Produced With Li, Ca, Ba, Sr, Na. A. L. De Sy. *Metal Progress,* v. 58, Sept. 1950, p. 357.

Research and micrographs showing structures produced with each of the above nodulizing agents. (E25, M27, CI)

450-E. Gates and Risers for High-Dross Non-Ferrous Alloys. H. W. Bennett. *American Foundryman,* v. 18, Sept. 1950, p. 24-26.

Various gating systems, their advantages and disadvantages. (E22, EG-a)

451-E. Insertion Process Cuts Cost of Matchplate Manufacture. Franz Schumacher. *American Foundryman,* v. 18, Sept. 1950, p. 30-31.

Patented process in use for three years at the Cooper Alloy Foundry Co., as a means of inserting aluminum, brass, wood and plastic patterns in plywood boards. (E17)

452-E. Automatic Machine Molds and Casts Iron Soil Pipe. *American Foundryman,* v. 18, Sept. 1950, p. 38-40.

Equipment and procedures of the Chattanooga foundry of Combustion Engineering-Superheater, Inc. Hand ramming is eliminated in the almost fully automatic cycle of 42 operations carried out in 25 timed sequences. Centrifugal force, which forms the pipe when the molten iron is poured, also gives the mold its preliminary shape. (E19, CI)

453-E. French Foundry Casts Chain Centrifugally. Robert Ronceray. *American Foundryman,* v. 18, Sept. 1950, p. 41-42.

Process produces almost 11 ft. of chain in a single mold. 128 links are cast at once in the form of a cylindrical cluster with 16 vertical rows of 7 links each, joined above and below by horizontal links. 39 cores are assembled to make the mold. (E14, CI)

454-E. Desulphurizing Gray Cast Iron With Magnesium. J. E. Rehder. *American Foundryman,* v. 18, Sept. 1950, p. 43-49.

Results of experimental work on effects of ladle additions, without reference to the formation of nodular graphite. Shows amount of desulfurization which can be accomplished when residual Mg content is limited to 0.02%. (E25, CI, Mg)

455-E. International Harvester Opens $1,200,000 Research Foundry. *American Foundryman,* v. 18, Sept. 1950, p. 50-53.
(E general, A9)

456-E. A.F.S. Foundry Glossary Defines Useful Foundry Terms. (Concluded.) *American Foundryman,* v. 18, Sept. 1950, p. 62-64, 82-83, 85-91.
Final section defines terms from "heat" to the end of the alphabet.
(E general, A10)

457-E. Better Cores at Lower Cost by Electronic Baking. Victor E. Hillman. *Iron Age,* v. 166, Sept. 28. 1950, p. 67-69.
Two years' experience at Crompton & Knowles Loom Works with synthetic core binders and electronic core baking shows higher quality and lower cost than with oil-fired baking. Savings on binder materials alone exceed $4000 yearly. Savings also accrue from faster core baking and reduced heating costs. (E21)

458-E. New Methods Produce Permanent Molds. G. A. Robinson. *Iron Age,* v. 166, Sept. 28, 1950, p. 82-84.
How low-cost permanent molds are produced accurately and speedily by use of sprayed metals. Molds for small patterns up to 1.5 sq. ft. of surface may be produced in two days by one man. Sprayed metal molds have been produced that will withstand temperatures up to 2900° F. (E12)

459-E. Precision Investment Castings Replace Parts Produced by Other Methods. Rawson L. Wood and Davidlee V. Ludwig. *Materials & Methods,* v. 32, Sept. 1950, p. 49-53.
Various cases in which significant economy and improvement in product performance have resulted from substitution of investment castings. (E15, CI)

460-E. Pressure Castings—Nickel-Alloyed Red Brass. James S. Vanick. *Foundry,* v. 78, Oct. 1950, p. 88-91.
Second of a series on Ni-alloyed bronzes. Mechanical properties and suggested foundry practice for different types. (E11, E25, Cu)

461-E. Application of a Fluidity Test Mold. E. C. Hart. *Foundry,* v. 78, Oct. 1950, p. 100-103.
Improved controls obtainable in the steel foundry through use of fluidity testing. The test mold used is produced by a core blower and wax developed primarily for ease in handling. (E25, CI)

462-E. Steel Foundry Core and Molding Sands. (Concluded.) John Howe Hall. *Foundry,* v. 78, Sept. 1950, p. 113, 240-245; Oct. 1950, p. 103, 226-231.
Development and application of cement-bonded sands. (E18, CI)

463-E. Permanent Mold Casting of Gray Iron. Herbert Chase. *Foundry,* v. 78, Oct. 1950, p. 110-113, 232-234.
Equipment and procedures at Delco Remy Div., General Motor Corp., Anderson, Ind. (E12, CI)

464-E. International Harvester Co. Dedicates New Research Foundry. *Foundry,* v. 78, Oct. 1950, p. 114-115, 169, 171-172.
(E general, A9)

465-E. Tilting Crucible Pours Permanent Molds. Arthur Q. Smith. *Foundry,* v. 78, Oct. 1950, p. 148.
Equipment and its use for pouring Al castings at Ebaloy Inc., Rockford, Ill. (E10, E23, Al)

466-E. Making Shell Molds of Resin and Sand. Frank W. Less. *Foundry,* v. 73, Oct. 1950, p. 162, 164, 168.
Process developed in Germany and known as the Croning or "C" process, which involves use of a dry mixture of sand and finely powdered phenolic resin. (E18)

467-E. Expanded Laboratory Facilities Provided for Core and Mold Wash Study. *Foundry,* v. 78, Oct. 1950, p. 174.
Facilities at U. S. Graphite Co., Saginaw, Mich. (E18)

468-E. Jigs and Fixtures for the Foundry. Thomas A. Dickinson. *Foundry,* v. 78, Oct. 1950, p. 200, 202, 204, 206.
Some typical examples; general design principles. (E22)

469-E. Lincoln's Meehanite Sets Standards. A. M. Baker. *Western Machinery and Steel World,* v. 41, Sept. 1950, p. 66-69.
Equipment and procedures of Lincoln Foundry Corp. (Southern Calif.) for production of Meehanite and ordinary gray-iron castings.
(E11, CI)

470-E. Magnesium-Zirconium Alloys; Development of Alloying and Fluxing Technique. A. E. Williams. *Metal Treatment and Drop Forging,* v. 17, Summer 1950, p. 73-77.
Effect of Zr on Mg alloys, including grain refinement and improved physical and mechanical properties. Comparative properties of alloys containing no Zr. (E25, Mg)

471-E. Penetration of Molten Metal Into Compact Sand. T. P. Hoar and D. V. Atterton. *Journal of the Iron and Steel Institute,* v. 166, Sept. 1950,

p. 1-17.

High-temperature ferrous castings were investigated by means of a laboratory apparatus capable of simulating practical conditions of temperature, pressure, metal movement, surface treatment of the mold, and chemical reaction between metal and mold. Shows that molten iron, steel, and a number of nonferrous metals do not wet silica, and that consequently a critical metallostatic pressure, termed "penetrating pressure", must be reached at the metal/sand-compact interface before penetration can occur. Penetrating pressure vs. metal surface tension and sand grain size. Influence of silica mold washes on penetrating pressure of iron. Calculations of rate and extent of penetration. 25 ref. (E23, CI)

472-E. High-Pressure Casting. (In German.) Karl Wellinger, Karl Göhring, and Gustav Stähli. *Zeitschrift für Metallkunde,* v. 41, Apr. 1950, p. 105-109.

Experiments on several Al alloys show that it is possible to cast simple as well as complex parts by die casting process. As compared to normal castings, pressure-cast parts have a better structure, greater strength, and greater toughness. (E13, Al)

473-E. The Theory of Addition and Removal of Gas From Molten Metal Baths. (In German.) Werner Geller. *Zeitschrift für Metallkunde,* v. 41, Apr. 1950, p. 124-127.

Theoretical, mathematical analysis of gas saturation and degasification for several assumed conditions. (E25)

474-E. The Status of Development of Light-Metal Melting Furnaces. (In German.) Philipp Schneider. *Neue Giesserei,* v. 37 (new ser., v. 3), July 13, 1950, p. 269-274.

Various types are described and diagrammed. (E10, Al, Mg)

475-E. Recent Advances in the Cement-Sand Molding Process. (In German.) Martin Beilhack. *Neue Giesserei,* v. 37 (new ser., v. 3), July 27, 1950, p. 296-300.

Objections to the process and how they can be successfully eliminated. (E18)

476-E. Rejects From the Gray-Iron Foundry With Special Emphasis on the Pig Iron Problem. (In German.) E. Feil. *Neue Giesserei,* v. 37 (new ser., v. 3), Aug. 10, 1950, p. 313-320.

Practical methods of casting control and causes of defective castings. How slag inclusions and structure of the pig iron affect composition, properties, and structure of the cast-iron product. 18 ref. (E11, CI)

477-E. Casting of Short-Circuited Rotors. (In French.) Jacques Piget. *Revue de l'Aluminium,* v. 27, May 1950, p. 197-202; June 1950, p. 291-299.

Various factors to be considered in their production from 99.5% Al. The equipment includes a melting furnace and a tunnel or rotary furnace for preheating the sheets. Molding methods include pressure die casting, centrifugal casting, and gravity die casting, jolted or vibrated. Effects of process variables on quality of the product. Double-casing rotors made of different alloys and recovery of sheet cores from rejected rotors. (E general, Al)

478-E. Production of Grate Bars. (In French.) Jean Guillamon. *Fonderie,* July 1950, p. 2129-2130.

Practical recommendations indicating type of cast iron to be used for different temperatures of operation, method of casting control, optimum conditions of casting. Data are tabulated. (E11, CI)

479-E. Western Casting of Repair Parts Saves Time — Gives Custom-Made Replacements. Carleton B. Tibbetts. *Western Metals,* v. 8, Sept. 1950, p. 24-26.

Procedures and equipment of Los Angeles Steel Casting Co., which makes repair parts for miscellaneous heavy equipment. (E general, CI)

480-E. Portable Air Tools in Foundry Practice. A. G. Ringer. *Canadian Metals,* v. 13, Sept. 1950, p. 16, 19, 36.

Man-hour output in a wide range of foundry operations can be increased by interchangeable air tools such as grinders, chippers, and sand rammers. (E24)

481-E. Castings for River and Coastal Craft. A. G. Thomson. *Foundry Trade Journal,* v. 89, Sept. 21, 1950, p. 269-272, 284.

Equipment and procedures of Victor Moyle & Co. in Britain for production of ferrous and nonferrous castings. (E general, T22)

482-E. Running Iron Castings; Use of Pencil Gates in a Ring Runner. Pierre Rigaut. *Foundry Trade Journal,* v. 89, Sept. 21, 1950, p. 283-284. Translated from *Fonderie.*

System is clarified by four diagrams. (E22, CI)

483-E. Improved Casting Production Practice. R. J. Wilcox. *Finish,* v. 7, Oct. 1950, p. 23-24, 72.

Information contained in *Steel Founders Society,* Research Report No. 18, "An Investigation of the Surface Finish of Steel Castings" was utilized to improve the surface

finish and cleanliness of generator end-frame castings. Solution of this problem led to the extension of the developments to manufacture of castings weighing 500-2000 lb. The work described consisted of a study of molding-sand mixtures in order to evaluate their resistance to metal penetration. It was found that simplified mixing and improved uniformity could be obtained by incorporating zirconite sand and flour into a silica-type paste. An aniline dye is added to indicate the proper end point during drying. Cost savings of 21.9% are reported and surface finish is improved. (E18, CI)

484-E. Foundry Sands. H. Ries. "Applied Sedimentation". John Wiley & Sons, New York, 1950, p. 475-482.

Properties, effect of elevated temperatures, and distribution in the U. S. 12 ref. (E18)

485-E. Ten Years of Advance in Ferrous Foundries. James T. MacKenzie. *Metal Progress,* v. 58, Oct. 1950, p. 499-502.

A survey. (E general, CI)

486-E. Die Cast Housings Permit Frequent Design Changes. *Die Castings,* v. 8, Oct. 1950, p. 25-26, 81-82.

Use in remote control devices manufactured by Barber-Colman Co., Rockford, Ill. An Al alloy is used in most cases. (E13, T8, Al)

487-E. 24 Ways To Avoid Trouble in Die Casting Design. Part Two. Hiram K. Barton. *Die Castings,* v. 8, Oct. 1950, p. 28-30, 83.

(E13)

488-E. Shot Control Unit Improves Surface Quality. *Die Castings,* v. 8, Oct. 1950, p. 32-35.

New device which causes metal to flow into the die at slow speed at first, followed by application of full pressure. This prevents turbulence, resulting in improved surface finish and reduced porosity. (E13)

489-E. How Modern Production Methods Are Used in Investment Foundries. Davidlee Von Ludwig. *Industrial Gas,* v. 29, Oct. 1950, p. 5-8, 22-26.

Miscellaneous gas-fired equipment used in the investment foundry. (E15)

490-E. Manufacture of Engineered Castings. Allan J. Kiesler, Edwin S. Lawrence, and John G. Holmes. *General Electric Review,* v. 53, Oct. 1950, p. 27-33.

Fundamental principles of the pouring and solidification of castings. How these are applied to design of the casting itself, to the mold, and to the gating and risering system. (E23, E22)

491-E. Basic Principles of Die Design: Cores and Core Mechanisms; Disposition of the Die Cavity. H. K. Barton and L. C. Barton. *Machinery* (London), v. 77, Sept. 28, 1950, p. 363-370.

Hydraulic core withdrawal and curved and helical cores. (E13)

492-E. "Soro" Process for the Casting of Bars. R. Genders. *Foundry Trade Journal,* v. 89, Sept. 28, 1950, p. 305-310, 312.

Centrifugal casting process developed by E. Schutz in 1937 to meet special circumstances which required production of brass bars without facilities for reduction of ordinary ingots. The bar is cast in the form of a ring or hoop, then cut and straightened. Macrographs and micrographs show structures of a variety of nonferrous alloys cast by this process. (E14, Cu, EG-a)

493-E. Electrically Heated Furnaces for Melting Light Metals. (In German.) Philipp Schneider. *Neue Giesserei,* v. 37 (new ser., v. 3), Aug. 24, 1950, p. 339-346.

Resistance and low-frequency induction furnaces. (E10, Al, Mg)

494-E. The Aachen Induction Cupola. (In German.) E. Piwowarsky. *Neue Giesserei,* v. 37 (new ser., v. 3), Sept. 7, 1950, p. 357-359.

Cupola furnace developed by the author. Advantages combine reduced cost and operating expenses with high-quality melts. (E10, CI)

495-E. Sources of Error and Loss in Metal-Melting Furnaces. (In German.) E. R. Thews. *Neue Giesserei,* v. 37 (new ser., v. 3), Sept. 7, 1950, p. 369-372.

Practical suggestions, especially on furnace control, selection of suitable fuels, prevention of metal loss as from evaporation, use of proper fluxes, and pouring practices. (E10)

496-E. Casting Molds for Repetition Production. (In Portuguese.) Manoel A. Moraes. *Boletim da Associacao Brasileira de Metais,* v. 6, Apr. 1950, p. 113-115.

Different types of molds used in the foundry are critically analyzed, indicating advantages and disadvantages, method of construction, and particular fields of application. (E19)

497-E. Interpretation of Moisture Determination in Foundry Sands. (In Portuguese.) Carlos Dias Brosch. *Boletim da Associacao Brasileira de Metais,* v. 6, Apr. 1950, p. 136-150.

Methods of moisture determination, indicating importance of the

moisture content in production of molds. Nomogram is presented for rapid determination of optimum moisture content of different sands used for casting iron, steel, and ferrous alloys. (E18)

498-E. Special Investment Casting Techniques. K. J. Yonker and G. A. Stolze. *American Foundryman,* v. 18, Oct. 1950, p. 33-36.

Specific examples of complex pieces which required unusual foundry setups (precoating, gating systems, pattern waxes, investment composition, firing schedules, etc.). (E15)

499-E. Producing Malleable Cast Iron; Basic Metallurgy and Operation Mechanisms. Leo R. Friedman. *American Foundryman,* v. 18, Oct. 1950, p. 39-41.

Effects of melting practice on annealing and physical properties, graphitization and other transformations, use of graphitizing elements, etc. (E10, N8, CI)

500-E. Modern Foundry Methods. Plastic Patternmaking for the Small Pattern Shop. E. J. McAfee. *American Foundryman,* v. 18, Oct. 1950, p. 42-45.

Procedures developed for producing phenolic resin patterns in metal-faced molds, at Puget Sound Naval Shipyard. (E17)

501-E. Nodular Iron Symposium Shows We Still Have Long Way To Go. Herbert F. Scobie. *American Foundryman,* v. 18, Oct. 1950, p. 46-48.

Summarizes proceedings of symposium held at Swampscott, Mass., Sept. 12-13, 1950. (E25, CI)

502-E. Foundry Practices for Aluminum Alloys. G. H. Bradshaw. *American Foundryman,* v. 18, Oct. 1950, p. 63.

Briefly summarized. (E general, Al)

503-E. Slagging Practice—A Means of Cupola Control. Thomas F. Hart. *American Foundryman,* v. 18, Oct. 1950, p. 64-66. Reprinted from *Australian Foundry Trade Journal,* May 1950.

Formation of slag in the cupola, which is often considered a necessary evil, is actually of great value for control purposes. Recommended slagging practice. (E10, CI)

504-E. Small Parts Fast—With Automatic Die Casting. *Modern Industry,* v. 20, Oct. 15, 1950, p. 40-41.

Production of die castings at rates of 35-350 per min. at Gries Reproducer Corp., New York City. Latest refinement is an "Intercasting" technique which produces parts with movable elements—unbroken chains and working scissors—in a single operation. (E13, Zn)

505-E. Casting Design for Economical Molding. Clarence T. Marek. *Foundry,* v. 78, Nov. 1950, p. 88-93, 248-252.

A chapter from the book, "Fundamentals in the Production and Design of Castings" See item 286-E, 1950. (E19)

506-E. Nodular Iron Experiments. E. M. Stein. *Foundry,* v. 78, Nov. 1950, p. 96-99, 214, 216-218, 220.

Experiments of Gunite Foundries Corp., Rockford, Ill. The following nodulizing alloys were used: 80-20 Ni-Mg, 50-50 Ni-Mg, 80-20 Cu-Mg, 70-30 Cu-Mg, 34-7 Si-Mg, (balance mainly Fe), and 43-9 Si-Mg (balance mainly Fe). The first one gave results far superior in consistency to the others used. (E25, CI)

507-E. Large Sculpture Group Cast in Aluminum. Joseph Morris. *Foundry,* v. 78, Nov. 1950, p. 102-105, 226-228.

Procedures and equipment used in production of "Venus and Manhattan", which decorates the face of the new Parke-Bernet Galleries Building, New York. The lost-wax process was used. (E15, Al)

508-E. A New Type of Cupola. Robert Doat. *Foundry,* v. 78, Nov. 1950, p. 172, 174-176.

See abstract of "The Metallurgical Blast Cupola", *Foundry Trade Journal,* item 446-E, 1950. (E10, CI)

509-E. Improved Molding Sand Effected by New Conditioner. *Foundry,* v. 78, Nov. 1950, p. 176.

Procedure of Zenith Foundry Co., West Allis, Wis. The sand is reconditioned daily by use of a "Sandmaster" unit. (E18)

510-E. J. I. Case Co. Modernizes Coremaking Facilities. *Foundry,* v. 78, Nov. 1950, p. 212, 214. (E21)

511-E. The Croning Process: A Fast Foundry Method for Making Molds and Cores. *Modern Metals,* v. 6, Oct. 1950, p. 22-24. (E18)

512-E. The Manufacture and Utilisation of Cast Iron Gas Mains. W. Boden. *Gas Times,* v. 64, Sept. 22, 1950, p. 419-421; v. 65, Oct. 6, 1950, p. 43-44. (E11, T4, CI)

513-E. Rationalisation of Sand Preparation. J. F. Goffart. *Foundry Trade Journal,* v. 89, Oct. 12, 1950, p. 319-326.

Previously abstracted from *Institute of British Foundrymen,* Paper No. 975, 1950. See item 347-E, 1950. (E18)

514-E. Foundry Practice. (In Czech.) Jiri Sequens. *Hutnické Listy,* v. 5, July 1950, p. 286-290.

Effects of temperature, pressure,

etc., on quality of castings. Recommendations for determining when to use vacuum furnaces, and for selection of protective atmospheres, addition agents, desulfurizers, deoxidizers, fluxes, etc. (E general)

515-E. Gating Systems. (In Czech.) Vaclav Oliverius. *Hutnické Listy,* v. 5, Aug. 1950, p. 321-325.

Design recommendations. (E22)

516-E. Diecast Magnesium Replaces Wood Chair Parts. A. J. Herek. *Iron Age,* v. 166, Nov. 2, 1950, p. 96-97.

Five magnesium die castings form frame of a new folding chair. Unusually long cores are used in casting the legs. Equipment and finished product. (E13, T10, Mg)

517-E. Effect of Rate of Freezing on Degree of Segregation in Alloys. William T. Olsen, Jr., and Ralph Hultgren. *Journal of Metals,* v. 188, Nov. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1323.

Shows experimentally that segregation can be completely suppressed by rapid rates of cooling. For the alloys studied, however, these rates are too great to be attained in commercial practice. An alloy of 55 atomic % Cu, 45 atomic % Ni was frozen by cooling at varying rates. Degree of segregation was determined by X-ray diffraction photographs. The experiments were repeated with an alloy of 16.5% Cu and 83.5% Au. A single experiment also showed a 50 atomic % Bi-Sb alloy had no segregation at the most rapid quench. (E25, N12)

518-E. A Comparison of Commercial Die Casting Machines. W. J. During. *Die Castings,* v. 8, Oct. 1950, p. 40-42, 80; Nov. 1950, p. 31-32, 71.

Advantages and disadvantages of various types of construction. Dimensional features of machines made by various companies for casting Zn and Al are shown in tabular form. (E13, Al, Zn)

519-E. Construction and Use of a 10-Ton Permanent Mold. J. C. Beattie. *Tool & Die Journal,* v. 16, Nov. 1950, p. 46-48.

Believed to be one of the largest permanent molds ever produced for use in pouring Al castings. The mold is made of "GA" Meehanite metal. It is used to make castings approximately 65 in. high and 46 in. diam. (E12, T5, Al, CI)

520-E. Duplicator Parts Precision Cast To Cut Costs. *Iron Age,* v. 166, Nov. 9, 1950, p. 102.

Substitution of precision investment casting for machining of drumlock and clutch-stop pawls for the Ditto D-44 Direct Process Duplicator. (E15)

521-E. Centrifugal Casting for Critical Components. Herbert Cooper. *Machine Design,* v. 22, Nov. 1950, p. 131-132.

Recent developments in techniques for casting stainless steel centrifugally in permanent metal molds have opened new avenues for design engineers. The process is suitable for applications such as pump liners, seat rings, and other critical cylindrical components. (E14, SS)

522-E. Centrifugal Casting in Permanent Molds. Warden F. Wilson. *Product Engineering,* v. 21, Nov. 1950, p. 112-116.

The process, its advantages, design factors, and applications. Tables give physical properties of centrifugally cast heat resistant steels and compositions, specifications, and applications of alloy and carbon steels suitable for centrifugal casting in permanent molds. (E14, CI, SG-h)

523-E. The Melting of Brass and Bronze. James G. Dick. *Canadian Metals,* v. 13, Oct. 1950, p. 22, 24, 26, 28-29, 43.

Directs attention to several current practices that must be avoided if high-quality melts are to be obtained. (E10, Cu)

524-E. Modern Methods of Melting Metals. *Machinery Lloyd* (Overseas Edition), v. 22, Oct. 14, 1950, p. 93-95, 97.

Equipment. (E10)

525-E. Cast Camshafts. *Automobile Engineer,* v. 40, Sept.-Oct. 1950, p. 345-347.

Development and application of "Monikrom" high-duty cast iron. Composition is 3.10-3.40% C, 2.00-2.40% Si, 0.50-0.080% Mn, 0.15-0.25% Ni, 0.80-1.00% Cr, and 0.15-0.25% Mo. Mechanical and service properties, design principles, and special casting technique. (E11, Q general, CI)

526-E. Review of the South African Foundry Industry. H. G. Goyns. *Foundry Trade Journal,* v. 89, Oct. 26, 1950, p. 333-341.

(E general)

527-E. Melting and Founding Practice for Aluminium Sand Casting Alloys. P. N. Gandhi. *Transactions of the Indian Institute of Metals,* v. 1, Apr. 1949, p. 163-173; discussion, p. 171.

Includes table of Al casting-alloy specifications. (E11, S22, Al)

528-E. Ferrous Melting Furnaces in the United States and Canada. (In English.) A. W. Gregg. "International Gieterij Congres 1949—Amsterdam", p. 31-53; discussion, p. 53-54.

Melting furnaces and auxiliary equipment for gray-iron foundries. Also those of steel and malleable foundries. Influence of technical societies on progress. Development of control and testing equipment. (E10, CI)

529-E. Foundry Melting Furnaces for Copper and Nickel Base Alloys. (In English.) F. C. Evans. "International Gieterij Congres 1949—Amsterdam", p. 65-76. discussion, p. 76-78.

The types of furnaces used, their advantages and disadvantages as related to metallurgical considerations, economic considerations, practical and local considerations, and personnel and welfare. 17 ref. (E10, Cu, Ni)

530-E. Some Metallurgical and Practical Aspects on the Melting of Copper Alloys. (In English.) A. Swagerman and Ir. H. Leutscher. "International Gieterij Congres 1949—Amsterdam", p. 89-100; discussion, p. 100-101.

Influence of gases on molten metal and causes of gas bubbles. Effect of melting method, melting furnace, quality of water in molding sand. Compares crucible, reverberatory, low-frequency, and indirect arc furnaces with respect to melting cost per ton, gas absorption, cost of capital investment, refining possibilities, and melting time. (E10, Cu)

531-E. Some Results of Belgian Research on Nodular Cast Iron. (In French.) Albert L. De Sy. "International Gieterij Congres 1949—Amsterdam", p. 118-131; discussion, p. 131-132.

See abstract of "Further Results of Belgian Nodular Cast Iron Research", *American Foundryman*, item 256-E, 1950. (E25, CI)

532-E. A Special Die-Casting Method. (In English.) E. M. H. Lips. "International Gieterij Congres 1949 — Amsterdam", p. 142-145; discussion, p. 145-146.

Previously abstracted from *Foundry Trade Journal*. See item 14C-93, 1949. (E13)

533-E. The Temperature of Liquid Steel in Relation to Fluidity and Sand Burning-on for Steel Castings. (In English.) A. J. Zuithoff. "International Gieterij Congres 1949—Amsterdam", p. 184-195; discussion, p. 195-197.

Factors affecting fluidity and methods of measurement. Usefulness of the latter in practice. The burned-on condition. Recent theories and experiments. 26 ref. (E25, CI)

534-E. Standardisation of Moulding Sand Testing and the Water Absorption Power Included. (In English.) M. Stap. "International Gieterij Congres 1949—Amsterdam", p. 200-215; discussion, p. 216-218.

The best-known methods for sand testing and their underlying principles. Suggestions for standardization. 17 ref. (E18)

535-E. Contribution to the Study of Preparation of Molding Sands. (In French.) L. J. Petrzela. "International Gieterij Congres 1949—Amsterdam", p. 219-233.

Methods of sand moistening and sand sifting were investigated. Devices for preparing synthetic sand with a bentonite bonding agent and for aging the prepared molds. Influence of raw material, variation of humidity, composition, aging, etc. 19 ref. (E18)

536-E. The Manufacture of Ingot Moulds in Cement-sand. (In English.) J. G. P. Bruschke. "International Gieterij Congres 1949—Amsterdam", p. 234-241; discussion, p. 241. (E11, T5)

537-E. The Manufacture of Metal Patterns and Core-boxes Without Machining by the Clay-Plaster Method. (In English.) J. Van Yperen. "International Gieterij Congres 1949—Amsterdam", p. 242-252; discussion, p. 252.

Method used by the N. V. Werkspoor engineering works, Utrecht, Holland, in mechanized molding and coremaking and for constructing bigger patterns and coreboxes. (E17, E21)

538-E. Car Engine Piston Rings Cast Centrifugally in Form of Sleeves. (In English.) P. Januszewicz. "International Gieterij Congres 1949—Amsterdam", p. 270-276; discussion, p. 276-277.

Difficulties in obtaining proper structure, particularly graphite of proper size and form. Method using centrifugal permanent molds coated with 10 mm. of molding sand which produces fine, uniformly distributed lamellar graphite. (E14, CI)

539-E. Non-Destructive Testing of Castings. (In English.) L. Van Ouwerkerk. "International Gieterij Congres 1949—Amsterdam", p. 288-298; discussion, p. 299-300.

Use of X-ray, sonic, magnetic and electrical methods. 25 ref. (E13)

540-E. Studies on Foundry Practice for Nonferrous Castings. I. The Relation Between Casting Weight, Gate Area, and Casting Speed. (In Japanese.) Tomoichi Nakata. *Journal of the Casting Institute of Japan*, v. 22, no. 7, 1950, p. 1-15.

These relations were studied for more than 100 Cu and Al alloy castings. The relation between gate area, casting speed, and casting weight can be roughly represented by a logarithmic curve. Proper casting

speed and gate area may be calculated from casting weight.
(E22, E23, Al, Cu)

541-E. Metal Penetration Into Castings. X. Penetration Into Copper Alloy Castings. (In Japanese.) Jiro Kashima. *Journal of the Casting Institute of Japan,* v. 22, no. 7, 1950, p. 15-21.

Experiments indicate that for Cu alloys which form CuO films on their surfaces, the presence of moisture in the mold increases the amount of CuO, and eventually the degree of penetration. (E19, Cu)

542-E. Notes on the Manufacture of a Cast Iron Electrical Grid. (In Japanese.) Seiichiro Fukuda. *Journal of the Casting Institute of Japan,* v. 22, no. 7, 1950, p. 21-24.

Recommended procedures.
(E19, CI)

543-E. Hydrogen and the Refining of Silumin. (In German.) Walter Mannchen. *Metall,* v. 4, Sept. 1950, p. 377-379.

Briefly reviews the literature dealing with the refining of silumin (Al-Si alloy) by additions of Na. Presents a new explanation of the refining effect of Na, showing that the H_2 released from the cooling melt acts as an inoculant and thus prevents supercooling. 15 ref.
(E25, Al)

544-E. Melting With Oxygen-Enriched Air in the Cupola Furnace; a Theoretical Study. (In German.) H. Jungbluth. *Neue Giesserei,* v. 37 (new ser., v. 3), Sept. 21, 1950, p. 382-387.
(E10, CI)

545-E. Compressed-Air and Jolt-Ramming Molding Machines; and Lifting and Turnover Types. (In German.) B. Gebhardt. *Neue Giesserei,* v. 37 (new ser., v. 3), Sept. 21, 1950, p. 397-405.
(E19)

546-E. Copper Phosphide as Deoxidant. (In German.) E. R. Thews. *Neue Giesserei,* v. 37 (new ser., v. 3), Sept. 21, 1950, p. 421-423.

The correct way of adding copper phosphide (with 10-15%) to various nonferrous melts and its effect on them. Reasons why a copper phosphide with 10% P is superior to one with 15% P. (E10, EG-a, Cu)

547-E. Inverted Segregation in Continuous Extrusion Casting. (In German.) Hermann Kästner. *Zeitschrift für Metallkunde,* v. 41, July 1950, p. 193-205; Aug. 1950, p. 247-254.

Results of an extensive experimental and theoretical study of the process and the accompanying segregation. Results of experiments on Sn bronzes and on Al alloys. A large number of analyses of metal from different zones in the castings (rods or tubes) were performed.
(E25, Cu, Al)

548-E. New Budd Foundry Produces 500 Brake Drums Per Hour. Thomas MacNew. *Automotive Industries,* v. 103, Nov. 15, 1950, p. 32-33, 110, 112.

Equipment and procedures.
(E11, CI)

549-E. 24 Ways To Avoid Trouble in Die Casting Design. Part Three. Hiram K. Barton. *Die Castings,* v. 8, Nov. 1950, p. 25-28.

Examples No. 15 to 24. (E13)

550-E. Casting and Forging of Titanium. J. Bartlett Sutton, Edwin A. Gee, and William B. DeLong. *Metal Progress,* v. 58, Nov. 1950, p. 716-720, 720B.

An induction furnace for melting titanium in graphite. Mechanical properties of the as-cast metal and its forging characteristics. Includes macrographs and micrographs, also hardness conversions for Ti and the relation between hardness and tensile strength.
(E10, Q general, F22, Ti)

551-E. Nodular Iron; Theory and Practice. *Metal Progress,* v. 58, Nov. 1950, p. 729-731.

Report on proceedings of a mid-Sept. conference arranged by Howard F. Taylor of MIT. Difficulties existing in the foundry production of nodular iron due to necessary close control of inoculant and variation of properties with section size, may be removed by metallurgical improvements, such as desulphurization in basic cupolas by calcium carbide flux.
(E25, CI)

552-E. Use of "Mazout" (Petroleum Residue) in the Foundry. (In French.) Georges Ulmer. *Fonderie,* Aug. 1950, p. 2153-2160.

Possibility of use as a fuel in melting and heat treating furnaces. Comparison with other fuels on technological and economic bases.
(E10, J general)

553-E. Centrifugal Casting of Bronze Jets. (In French.) Pierre Nicolas. *Fonderie,* Aug. 1950, p. 2161-2162.

Apparatus and procedure for casting jets having an o.d. of 80 mm. and a minimum i.d. of 25-30 mm.
(E14, Cu)

554-E. Some Design Principles for Steel Castings. (In German.) Heinrich Resow. *Neue Giesserei,* v. 37 (new ser., v. 3), Oct. 5, 1950, p. 444-448.
(E general, CI)

555-E. (Book) **Casting and Forming Processes in Manufacture.** James S. Campbell, Jr. 536 pages. McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y. $5.

Text written for mechanical engineering students, to acquaint them with all of the casting processes, the molding and forming of plastics, powder metallurgy, rolling, forging, sheet-metal working, and punch-press operations. Machine-shop and welding processes are not included. (E general, F general, G general, H general)

556-E. (Book) **Penton's Foundry List, 1949-1950 Ed.** Unpaged. 1949. Penton Publishing Co., Penton Bldg., 1213 W. Third St., Cleveland 13, Ohio.

A directory of gray iron, **malleable** iron, steel, brass, bronze, **aluminum,** and magnesium foundries in the U. S. and Canada, including also pattern shops, machine shops, and laboratories operated as departments.
(E general, A10, CI, Al, Cu, Mg)

557-E. (Book) **International Gieterij Congres 1949—Amsterdam.** (International Foundry Congress 1949—Amsterdam). 309 pages. "Metalen", Drukkerij Uitgeverij "de Hofstad", 1-3 Scheepmakersstraat, 's-Gravenhage, Netherlands.

Complete proceedings of above conference, including 20 papers which are separately abstracted. The latter are in English or French. Other material is in Dutch.
(E general)

558-E. (Book) **Machinenformerei** (Machine Molding). **Ed. 2.** U. Lohse and H. Allendorf. 72 pages. Springer-Verlag, Berlin, Germany. 3.60 DM.

One of a series of workshop manuals relating to production of castings on molding machines. Three main sections describe working principles of the molding machine, machines for manufacturing the mold, and machines for producing cores.
(E19)

559-E. Pneumatic Tools — Foundry Uses. *American Foundryman,* v. 18, Nov. 1950, p. 28-30.

Grinders, chipping hammers; scaling hammers; sand rammers; hoists.
(E24, G18)

560-E. Fume Control—Electric Melting Furnaces. J. M. Kane and R. V. Sloan. *American Foundryman,* v. 18, Nov. 1950, p. 33-35.

Emission of solids of the order of 5-8 lb. per hr. per ton of metal melted can be expected from electric melting furnaces in steel foundries. Particle sizes of solids, primarily FeO and Fe_2O_3 with some silica, are 95% less than 0.5 micron. Reduction of quantity of solids by about 75% can be obtained with good wet dust-collection equipment.
(E10, A7, CI)

561-E. Demonstrate Shell Molding Process at Foundry Exhibit. *American Foundryman,* v. 18, Nov. 1950, p. 38-41.

New process for producing foundry molds and cores said to combine the advantages of increased production, reduced cost, and improved quality of the casting. The method, developed by Johannes Croning of Hamburg, Germany, employs a thermosetting plastic as a sand binder to produce a shell mold by application of the resin-sand mixture to a heated pattern. (E18)

562-E. Steel Casting in South Africa —Feeding Techniques. H. G. Goyns. *American Foundryman,* v. 18, Nov. 1950, p. 50-55.

Typical examples. (E23, CI)

563-E. Profits From Nodular Iron. B. Dixon. *Canadian Metals,* v. 13, Nov. 1950, p. 14-16, 43.

Practical experiences of Dominion Wheel & Foundries, Ltd., in producing superior castings of nodular iron. (E25, CI)

564-E. Special Equipment for Making Huge Die Cast Grille. *Automotive Industries,* v. 103, Dec. 1, 1950, p. 48, 76, 78.

Equipment and procedures for making Zn alloy Packard grille.
(E13, T21, Zn)

565-E. Insulation Increases Riser Efficiency. W. H. Piper, Jr., and James O'Keefe, Jr. *Foundry,* v. 78, Dec. 1950, p. 72-75, 134, 137, 139.

Use of insulated risers by Erie Bronze Co., in production of a wide variety of bronze castings typical of a jobbing foundry. (E22, Cu)

566-E. Permanent Mold Casting of Aluminum Engine Blocks. *Foundry,* v. 78, Dec. 1950, p. 84-85, 152, 154.

Procedures at Progress Pattern & Foundry Co., Saint Paul, Minn.
(E12, Al)

567-E. Development and Evaluation of Cast Turbine Rotors. N. J. Grant, L. W. Kates, and N. E. Hamilton. *Foundry,* v. 78, Dec. 1950, p. 86-93, 234-239.

The practicability of casting gas turbine rotors, rather than forging them, has been demonstrated by investigations performed by MIT for the U. S. Navy's Bureau of Ships. Production methods and mechanical properties of the cast rotors. Alloy N-155 (30% Ni, 20% Cr, 20% Co, 3% Mo, 2.2% W, 1.3% Cb, 1.5% Mn, 0.15-0.30% C, and balance Fe) was chosen for the investigation. A wide range of grain sizes and shapes was obtained by use of

mold materials of widely differing heat conductivity.
(E19, E25, Q general, SG-h)

568-E. Magnesium Alloys Containing Zirconium. George W. Orton. *Foundry,* v. 78, Dec. 1950, p. 95, 156, 158.

Methods for introducing Zr into Mg were investigated. The best results were achieved by use of Zr salts. Mechanical properties of the Mg-Zn-Zr alloys thus produced were found to be appreciably better than those of commercially available alloys. (E10, Q general, Mg)

569-E. Manufacture of Cast Steel Rolls. Samuel R. Robinson. *Foundry,* v. 78, Dec. 1950, p. 188, 190, 192.

Recommendations, including compositions for specific types and uses, melting and molding practice, annealing cycles, pouring temperatures, etc. (E11, J23, T5, CI)

570-E. Unique Insertion Process Cuts Pattern Making Costs. Franz Schumacher. *Tool & Die Journal,* v. 16, Dec. 1950, p. 72.

Process developed by Cooper Alloy Foundry Co. Lists eight major advantages. Plastic patterns are mounted on plates by use of inserts and low-melting alloy sealing. (E17)

571-E. Production of Complex Precision Die Castings Speeded With Less Rejects by Western Plant. Joseph L. Haver. *Western Metals,* v. 8, Nov. 1950, p. 21-23.

Equipment and procedures of Withrow Die Casting Co., Los Angeles. (E13)

572-E. Foundry Organization; Operations at a Repetition, Semi-Mass-Production Foundry. *Iron and Steel,* v. 23, Sept.-Nov. 1950, p. 369-372.

Practice at a British foundry. Shows how choice of most economical degree of mechanization for a given job is made after consideration of the various factors involved. (E general, CI)

573-E. Possible Uses of Radioactive Isotopes in the Foundry. J. E. Johnston. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Oct. 1950, p. 523-529; discussion, p. 529-531.

Fundamentals and some applications which have already been made. (E general, S19)

574-E. The Use of Low Phosphorus Cast Iron for Light Castings. A. N. Sumner. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Oct. 1950, p. 555-558; discussion, p. 558.

Experiences of a Scottish firm. Practice has been beneficial in every respect, particularly in connection with losses through breakage, either in subsequent processing or in transit. (E11, Q general, CI)

575-E. The Nodular Structures of Chilled Magnesium and Cerium Treated Irons After Heat Treatment. J. W. Grant. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Oct. 1950, p. 571-574.

Effects of different factors.
(E25, J general, CI)

576-E. Modern Cupola Design and Operation at Home and Abroad. W. J. Driscoll. *British Iron and Steel Research Association.* "Conference on Cupola and Converter Refractories", 1949, p. 21-22.

Reviews recent trends in Europe and America. (E10, ST)

577-E. Cupola Refractories—A Review of the Literature. W. A. Archibald. *Iron and Steel Research Association,* "Conference on Cupola and Converter Refractories", 1949, p. 23-29; discussion, p. 30-31.

Covers location of wear, acid lining materials, acid patching materials, basic lining materials, cupola design and construction, operating conditions, lining life, and mechanism of slag attack. 71 ref.
(E10, ST)

578-E. Some French Developments in Cupola Linings. M. P. Nicolas. *Iron and Steel Research Association,* "Conference on Cupola and Converter Refractories", 1949, p. 32-33.

Improvements of the quality of ganister lining. Satisfactory application of the results to practice.
(E10, ST)

579-E. Refractories for Bessemer Steel Foundries in Germany. K. J. Ferdinand Klein. *Iron and Steel Research Association,* "Conference on Cupola and Converter Refractories", 1949, p. 34-35.

Developments in lining of melting units. (E10, D3, ST)

580-E. Water Cooled Cupolas. W. H. Bamford. *Iron and Steel Research Association,* "Conference on Cupola and Converter Refractories", 1949, p. 36-37.

Water-cooling procedure and its results in increasing cupola life to meet increased demands for steel castings. (E10, ST)

581-E. Developments in Foundry Refractories. G. R. Rigby. *Iron and Steel Research Association,* "Conference on Cupola and Converter Refractories, 1949, p. 39-41; discussion, p. 50-51,

Lines for future developments, particularly in rammed linings.
(E10, ST)

582-E. Melting, Deoxidizing, and Casting Heavy Nonferrous Metals. (In German.) Eugen Tofaute. *Neue Giesserei*, v. 37 (new ser., v. 3), Oct. 19, 1950, p. 466-469.

A general survey. Series of elements arranged according to their affinity for oxygen. Practical recommendations. (E10, EG-a)

583-E. Testing Casting Properties; A Practical Method for Assessing the "Local Shrinkage" Defect. E. Scheuer, S. Williams, and J. Wood. *Metal Industry*, v. 77, Dec. 1, 1950, p. 235-239.

New method indicates that the trouble is directly connected with differences in gas content of the metal. Principle of the method was to induce shrinkage in one area by creating an artificial "hot spot." Various methods of producing the "hot spot" by provision of an insulating material in the die face were tried, also various die designs. The work was done on Al alloys of various compositions. (E25, Al)

584-E. Steel Castings—Past, Present and Future. J. F. B. Jackson. *Metallurgia*, v. 42, Nov. 1950, p. 285-288.

Reviews progress of last 20 years in foundry practice and inspection. (E11, S13, CI)

585-E. Twenty-One Years of Iron Foundry Progress. J. Blakiston. *Metallurgia*, v. 42, Nov. 1950, p. 344-346.

A review. (E general, Fe)

SECTION F

PRIMARY MECHANICAL WORKING

1F. Manufacturing Controls of Large Steel Forgings. Todd Gardner. *Iron Age,* v. 164, Dec. 29, 1949, p. 46-48.

Heating and cooling, deflaking, and ultrasonic inspection methods. (F22, S13, ST)

2F. An Improved Automatic Gas Fired Forge Furnace. James R. Ross. *Industrial Gas,* v. 28, Dec. 1949, p. 6-7.

Furnace used for billet heating at Chevrolet Forge Div., General Motors Corp. (F21)

3F. Rolls and Rolling. Part XI. E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 37, Dec. 1949, p. 1456-1462.

Roll passes for octagonal shapes. (F23)

4F. New Ways of Producing Pipe Cut Costs at Basalt. *Western Metals,* v. 7, Dec. 1949, p. 26-27.

Novel equipment and procedures developed for production of welded steel pipe. (F26)

5F. Recent Developments in Forging Technique. *Machinery* (London), v. 75, Dec. 15, 1949, p. 847-852.

Equipment and procedures of Ford Motor Co.'s Canton, Ohio, plant. (F22)

6F. Comparative Advantages of Modern Soaking Pits. II. (Concluded.) E. A. Brown, Jr. *Industrial Heating,* v. 16, Dec. 1949, p. 2170, 2172, 2174, 2176, 2178.

Bottom two-way-fired and tangentially-fired pits. The effects of capacity considerations and temperature uniformity requirements on soaking pit selection. (F21)

7F. Rolling Mills; German Plant and War-Time Practice. *Iron and Steel,* v. 22, Dec. 1949, p. 635-638. Condensed from BIOS Overall Report No. 15, Section III, "The Ferrous Metal Industry in Germany During the Period 1939-1945", by Geo. Patchin and E. Brewin.

Also deals with forging, drop forging, stamping and drawing, the production of tubes and pressure vessels. (F general)

8F. Large Seamless Steel Tube Mill at Clydesdale. *Engineer,* v. 188, Dec. 9, 1949, p. 664-665; Dec. 16, 1949, p. 698-700.

(F26)

9F. Advances in the Field of Cold Rolling of Strip Steel During the Last Decade. (In German.) Anton Pomp. *Stahl und Eisen,* v. 69, Nov. 24, 1949, p. 863-879.

Historical review. 299 ref. (F23, ST)

10F. Cold-Rolling Tests With Longitudinal Tensile Stresses. (In German.) Werner Lueg and Emil Greiner. *Stahl und Eisen,* v. 69, Nov. 24, 1949, p. 879-884.

Tests with four different steels showed that tensile stresses in the steel reduced the rolling pressure of the mill. Back-pull reduces rolling pressure more than the tensile stress on the reel. Longitudinal tensile stresses reduce considerably the total amount of energy required for a given rolling operation. (F23, ST)

11F. Production of Wire and Wire Rods. Kenneth B. Lewis. *Steel,* v. 125, Dec. 26, 1949, p. 58, 60-61, 63-64, 66-67; v. 126, Jan. 9, 1950, p. 66, 68, 71-72, 74; Jan. 16, 1950, p. 70, 73-74, 76, 79.

Processes and equipment used in the manufacture of wire from antiquity to the present day. Includes preliminary cleaning operations. Part II: A variety of modern equipment, including that for the annealing or patenting stop. Part III: Application of Zn coatings, manufacture of special products such as nails and fence, and possible future developments. (F28, J25, L16)

12F. Forging Flexibility Enhanced by Gas-Fired Furnace. James R. Ross.

Steel, v. 126, Jan. 16, 1950, p. 61-62.

New gas-fired billet heating furnace at Chevrolet Forge Division, General Motors Corp. (F22)

13F. Cold Strip Rolling. Frank H. Slade. *Machinery Lloyd* (Overseas Edition), v. 21, Dec. 17, 1949, p. 80-83, 85, 87.

Procedures for gage reduction of hot-rolled strip steel. Includes pickling, cleaning, annealing, etc. (F23)

14-F. Selection of Forging as a Method of Fabrication. J. J. Sloan and L. R. Denny. *Iron Age,* v. 165, Jan. 19, 1950, p. 70-75.

Weighs forging against other fabrication methods with respect to function, design, and cost. Comparative cost analysis of typical aircraft parts. Materials considered are Al and Mg alloys, and a variety of steels. (F22, T24, Al, Mg, ST)

15-F. Low Cost Manufacture of Large Diameter Pipe. Paul J. Abel. *Iron Age,* v. 165, Jan. 26, 1950, p. 77-82.

Freight rates, duties, insurance, and other cost factors favor fabricating plate at pipe mills near the point of consumption rather than purchasing completed pipe. Production methods, equipment, and sequences, as well as production and cost figures. (F26, ST)

16-F. Graphical Analysis of Power Consumption in Hot Rolling. J. H. Mort. *Sheet Metal Industries,* v. 27, Jan. 1950, p. 5-18, 20.

Based on operating data and on theoretical calculations. Power curves based on displacement are more reliable as guides to energy expenditure per unit of weight than those founded on elongation. (F23)

17-F. Western Pipe Goes East. Gordon B. Ashmead. *Western Machinery and Steel World,* v. 41, Jan. 1950, p. 66-69, 92-93.

Miscellaneous pipe manufacturing equipment of Basalt Rock Co., which produces steel pipe from plate furnished by Kaiser Steel Corp. Included are flame cutting, forming, welding, coating, etc. (F26, ST)

18-F. Forging for Fabrication. J. J. Sloan and L. R. Denny. *Western Machinery and Steel World,* v. 41, Jan. 1950, p. 74-77, 98.

Forging of steels and Mg and Al alloys by North American Aviation. (F22, ST, Al, Mg)

19-F. Seamless Tubes: A Pictorial Story. *Western Machinery and Steel World,* v. 41, Jan. 1950, p. 78-79.

Manufacture of Al tubes by extrusion. (F26, F24, Al)

20-F. Ferrous and Nonferrous Metals Handled by Moderate Production Shear Line. *Steel,* v. 126, Jan. 30, 1950, p. 54.

Line developed for use in steel, brass, or copper mills, warehouses and fabricating plants. It consists of a coil stop, payoff reel, roller leveller, looping table, upcut shear, gage table and automatic gage unit, oiling unit, pinch rolls, and sheet piler. (F29)

21-F. Effective Designing With Aluminum Extrusions. H. V. Menking. *Modern Metals,* v. 5, Jan. 1950, p. 16-20.

Wide range of design possibilities inherent in extrusion of Al, as well as basic engineering principles of this process. (F24, Al)

22-F. Ingot Heat Conservation; Time Studies From Casting to Rolling. A. V. Brancker, J. Stringer, and L. H. W. Savage. *Journal of the Iron and Steel Institute,* v. 164, Jan. 1950, p. 67-84.

Observations were made at three plants of the progress of hot ingots from the casting bay to the cogging mill, in an attempt to find the causes of delays and their effects on soaking-pit operations. Worthwhile savings are possible, especially in reduction of time during which ingots can lose heat between teeming and charging to the soaking pit. (F21, ST)

23-F. A Summary of Accomplishments To Improve Surface Quality of Steel. S. C. Faddis. *American Iron and Steel Institute,* "Technical Committee Activities", 1949, p. 340-356.

Various causes of surface defects which include raw materials, refining processes, blooming mill practices, scarfing, and rolling. Includes graphs and illustrations. (F general, D general, ST)

24-F. Ring Forging Speeded on First Western Roller at C.B.S. *Western Metals,* v. 8, Jan. 1950, p. 28.

Equipment and procedure for producing forged continuous rings up to 7 ft. in diam. without welding. A roller method is used. (F23, F22)

25-F. Resistance Heating for Hot Forming 75S-T6 Aluminum. A. L. Schoellerman. *Product Engineering,* v. 21, Feb. 1950, p. 85-87.

In a test program, Northrop engineers attempted to determine which of two resistance-heating methods would give most satisfactory production. In evaluating the two types, effect of time and temperature on physical properties, heating time vs. cross-sectional area, and methods of temperature control were investigated. (F21, Al)

26-F. Effect of Carbon in Titanium Metal Ingots. E. A. Gee, J. B. Sutton,

and W. J. Barth. *Industrial and Engineering Chemistry*, v. 42, Feb. 1950, p. 243-249.

Titanium ingots containing 0-1.5% C were forged and rolled. Such ingots can be forged readily at 1700° F. All metal was rolled at 1450° F. without extensive surface or edge checking, excepting the highest carbon ingot. Ultimate tensile strength, yield strength, elongation, bend ductility, and hardness.
(F22, F23, Q general, Ti)

27-F. Electric Equipment for Rolling Cold Strip at 70 MPH. William E. Miller. *Iron and Steel Engineer*, v. 27, Jan. 1950, p. 119-126; discussion, p. 126-128.

Equipment in service at Jones and Laughlin's tinplate mill. 10 ref. (F23, ST)

28-F. The Rolling of Stainless Steel. John A. De Fries. *Iron and Steel Engineer*, v. 27, Jan. 1950, p. 129-132; discussion, p. 132.

Recommended equipment and procedures for various grades. (F23, SS)

29-F. Better Welds Expected From New Electric Tube Welding Process. John B. Borgadt. *Steel*, v. 126, Feb. 13, 1950, p. 99-100, 102, 104.

Improved welds, freedom from inclusions, increased wall thickness, and applicability to a greater variety of steels are among the advantages cited for an air-operated intermittent machine which employs surface-contact electrodes to convey current across seam cleft of the tube. A combination of mechanical and electrical devices produces a good tube weld with fine grain structure almost equal to parent metal. (F26)

30-F. Symposium on Tungsten Carbide Dies. *Wire and Wire Products*, v. 25, Feb. 1950, p. 133-135, 138-143, 166-171.

Use of tungsten carbide dies in wiredrawing. (F28)

31-F. Symposium on the Use and Care of Diamond Wire Drawing Dies. *Wire and Wire Products*, v. 25, Feb. 1950, p. 145-147, 156-157, 159-164. (F28)

32-F. A Review of the Forging Industry. Harry L. Showalter, Jr. *Steel Processing*, v. 36, Jan. 1950, p. 26-30, 44.

Reviews 1949 developments. (F22, ST)

33-F. Production Line Heating for Forging. Frederick O. Hess. *Steel Processing*, v. 36, Jan. 1950, p. 37-42.

Use of radiant gas heating. Differences in surface and internal structures of steel after high-speed and conventional heating. (F21, ST)

34-F. Scovill's New Mill for Rolling Brass Strip. Harold J. Roast. *Metal Progress*, v. 57, Feb. 1950, p. 197-200.

New mill, which is completely automatic from flat metal casting to packaging. (F23, Cu)

35-F. Fast Heating of Large Diameter Pipe. Richard M. Hortvet. *Iron Age*, v. 165, Feb. 16, 1950, p. 97-99.

Use of the high-temperature-head principle to heat pipe and tubing rapidly. The unit solves the problem of inadequate length of regular furnaces used in manufacture of steel pipe 40 ft. long. (F26, ST)

36-F. Forging Stainless Steel. Lester F. Spencer. *Iron Age*, v. 165, Feb. 16, 1950, p. 100-104.

Methods and equipment used in forging stainless stock. (F22, SS)

37-F. Aluminium Rolling in Chile. *Light Metals*, v. 13, Feb. 1950, p. 78-79.

Proposed new plant. (F23, Al)

38-F. A Line on Pipes. *Ethyl News*, Feb. 1950, p. 7-9.

Manufacture of large pipes for pipelines. Includes cleaning and finishing, forming, and welding. (F26)

39-F. Precision Sheet-Metal Parts; Manufacture of Assemblies for American Gas-Turbine Engines. W. C. Heath. *Aircraft Production*, v. 12, Feb. 1950, p. 58-62.

Miscellaneous forming, machining, and welding equipment and procedures. Materials used are Inconel and stainless steels. (T24, Ni, SS)

40-F. Mill Tackle; Precision Design for Improved Quality of Product. M. S. Doshi. *Iron and Steel*, v. 23, Feb. 1950, p. 39-45.

The different components used in rolling-mill practice, their design, and functions. How the quality and quantity of the rolled product can be considerably improved, and how manual work can be eliminated, especially in the rolling of heavy rails, by providing the right kind of equipment. (F23)

41-F. French Steel Sheets; Reconstruction of Mill Plant at the Forges de Leval-Aulnoye. *Iron and Steel*, v. 23, Feb. 1950, p. 55-57. (F23, ST)

42-F. Production Economy in the Rolling of Aluminium. W. J. Thomas and W. A. Fowler. *Engineering*, v. 169, Jan. 6, 1950, p. 26-27; Jan. 13, 1950, p. 36-37; Jan. 20, 1950, p. 64-65. (Condensed.)

A series of new problems resulting from the installation of continuous or semi-continuous mills. Solution of these problems would result in improved economy and quality of product. (F23, Al)

43-F. (Book) Manual of Open Die Forgings. 181 pages. Open Die Forging Industry, 366 Madison Ave., New York 17, N. Y. $3.00.

A careful statement of modern trade practices in the manufacture, heat treatment, testing and inspection of heavy forgings or press work, solid or hollow, which (if read and comprehended) should do much to prevent expensive disagreements between vendors and meticulous purchasers.—E.E.T. (F22)

44-F. Forging With Controlled Atmospheres. C. A. Carlson. *Industrial Gas*, v. 28, Feb. 1950, p. 11, 27.

Forging furnace for use in manufacture of pole-line hardware. (F22)

45-F. Die Sinking for Drop Forging. Part VII. Preliminary Operations. John Mueller. *Steel Processing*, v. 36, Feb. 1950, p. 76-79. (F22)

46-F. Rolled and Forged Circular Products Produced on Special Mill by Bethlehem. *Steel Processing*, v. 36, Feb. 1950, p. 84-86.

Mill practice. Includes heat treatment (heating, quenching, and tempering). (F23, J general, ST)

47-F. Huge Billet Shear Cuts Drop Forging Slugs to Accurate Length for End Use in Automobile Components. *Steel*, v. 126, Feb. 27, 1950, p. 78. (F29)

48-F. The Hot Working of Nickel and High-Nickel Alloys. *Metallurgia*, v. 41, Jan. 1950, p. 127-133.

Success depends upon correct heating. Means and time of heating, and temperatures for various operations. Important aspects of hot working for developing techniques to insure the most desirable properties. (F21, Ni)

49-F. Hot Working. I. (In Japanese.) Tadao Sato. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, July 1949, p. 1-3.

The relationships between mechanical properties of extruded Al and Mg alloys, chemical compositions, and working conditions. (F24, Q general, Al, Mg)

50-F. Use of Molybdenum Widens. *Iron Age*, v. 165, Mar. 2, 1950, p. 94.

New production technique by which ingots averaging 50 lb. in weight are made. Slab ingots for plate and sheet rolling or rounds for rod rolling are readily formed. The green-pressed pieces are surface-conditioned and then treated by a special high-temperature process. (F general, Mo)

51-F. Rod Caps Forged Ten to the Bar. Herbert Chase. *Automotive Industries*, v. 102, Mar. 1, 1950, p. 36-37.

Forging equipment. SAE 1038 round bar stock is used. (F22, T21, CN)

52-F. Integrally Stiffened Structures. Paul Sandorff and G. W. Papen. *Aeronautical Engineering Review*, v. 9, Feb. 1950, p. 30-38.

Several methods are available for manufacturing large integrally stiffened surface panels, for example: extrusion, forging, rolling, casting, machining from plate, etc. Advantages, limitations, and potentialities of each method are discussed. (F general, G general, T26)

53-F. How Is Capillary Tubing Made? L. E. Gibbs. *Refrigerating Engineering*, v. 58, Mar. 1950, p. 252-254, 290.

Production and testing of seamless copper capillary tubing, usually between 0.026 and 0.049 in. i.d., to tolerances as close as $\pm$ 0.001 in. Hot extrusion of a large hollow-shell is followed by a series of cold drawing operations. (F24, Cu)

54-F. How To Choose Wire Drawing Lubricants. E. L. H. Bastian. *Iron Age*, v. 165, Mar. 9, 1950, p. 65-69, 86.

Lubricant recommendations for rod, intermediate wire, and fine wire drawing in wet and dry systems. Information applicable to common ferrous and nonferrous metals. (F1, F27)

55-F. Fundamentals of Drop Forging Design. F. Walker. *Metal Treatment and Drop Forging*, v. 16, Winter 1949-50, p. 219-224.

The importance of design of drop forgings and its effects on rate of production and die life. Position of the parting plane, in individual basic shapes, and then in more complicated shapes. Die tolerances and machine allowances. (F22)

56-F. The Hot Rolling of Aluminium and Its Alloys. F. Kasz and P. C. Varley. *Journal of the Institute of Metals*, v. 76, Jan. 1950, p. 407-428.

Current practice. Preheating of the rolling slab. Physical and metallurgical aspects and mode of deformation. Effect of hot rolling upon metallurgical constitution and influence of hot rolling variables upon behavior of the finished product after final cold rolling. (F23, Al)

57-F. The Extrusion of Aluminium Alloys. Christopher Smith. *Journal of the Institute of Metals*, v. 76, Jan. 1950, p. 429-451.

Die manufacture, and the nature of the flow that normally occurs in the extrusion of nonferrous alloys. Problems associated with the produc-

tion of heat treated alloys in the form of extrusions. (F24, Q24, Al)

58-F. The Hot Forging and Hot Stamping of Aluminium and Its Alloys. F. E. Stokeld. *Journal of the Institute of Metals,* v. 76, Jan. 1950, p. 453-472.

General aspects and some differences between the forging of these materials and the forging of steels. Strength and ductility at particular locations in the forgings. Influences of various factors. 34 ref. (F22, G3, Q23, Al)

59-F. The Hot Working of Magnesium and Its Alloys. R. G. Wilkinson and F. A. Fox. *Journal of the Institute of Metals,* v. 76, Jan. 1950, p. 473-500.

Current practice in rolling, extrusion, and forging. Importance of the direct-chill casting process; stock so produced in the new Zn-containing high-strength alloys can be hot worked over a wide temperature range. British research which has shown that modern Mg-base alloys can be hot worked under drastic conditions similar to those applied to mild steel. Possible future developments. 24 ref. (F22, F23, F24, Mg)

60-F. The Hot Working of Copper and Copper Alloys. Maurice Cook and Edwin Davis. *Journal of the Institute of Metals,* v. 76, Jan. 1950, p. 501-526.

Metallurgical and operational factors. Various tests for evaluating hot working properties and their applicability. Hot workability of various alloys such as the brasses, Al bronzes, Ni silvers, cupro-nickels, and Si bronzes; effect of composition as related to constitution; effect of additional alloying elements and impurities. Metallurgical features of industrial hot working processes, such as rolling, extrusion, piercing, and forging. 32 ref. (F general, Q23, Cu)

61-F. The Hot Working of Tin Bronzes. D. W. Dugard Showell. *Journal of the Institute of Metals,* v. 76, Jan. 1950, p. 527-540.

Influence of various factors on the hot working of phosphorized Sn bronzes. Use of pure materials is thought to be essential, because of the tendency of low-melting-point impurities to segregate in the grain boundaries. Harmful effects both of these impurities and of tin sweat can be reduced by controlled melting and pouring. 13 ref. (F general, Q23, Cu)

62-F. The Hot Working of Lead and Lead-Rich Alloys. L. H. Back. *Journal of the Institute of Metals,* v. 76, Jan. 1950, p. 541-556.

Sheathing of cable by both lead presses and extrusion machines. The manner in which certain extrusion faults take place. Production of lead pipe, lead sheet, and collapsible lead tubes. (F24, Pb)

63-F. The Rolling of Zinc and Zinc-Rich Alloys. C. W. Roberts and B. Walters. *Journal of the Institute of Metals,* v. 76, Jan. 1950, p. 557-580.

Methods used for production of Zn and Zn-alloy sheet and strip; brief reference to the manufacture of other rolled forms. Metallurgical problems associated with the rolling operations, and effect on mechanical properties. 18 ref. (F23, Q general, Zn)

64-F. Determining the Required Efficiency in Bar-Steel Drawing. (In German.) Fritz Boehm. *Stahl und Eisen,* v. 69, Dec. 8, 1949, p. 931-938.

The energy consumption of drawbench motors used in the drawing of seven groups of steel under widely different operating conditions was determined and a method of determining drawing efficiency in relation to reduction in cross-section at various drawing rates was derived. Graphs show the effect of drawing rate, initial strength, and initial and final bar diameters on energy consumption. 6 ref. (F27, CN)

65-F. Production of Sewing Machine Needles for the Garment Industry. (In German.) Joachim F. Wallenstein. *Stahl und Eisen,* v. 69, Dec. 22, 1949, p. 943-948.

Different types of needles (including phonograph needles and shoemaker's needles) and the sequence of operations required in their production. Properties of needle steels. (F28, T10, CN)

66-F. Requirements of the Wire Used for Sewing-Machine Needles. (In German.) Bernhard Schmetz and Heinz Kensche. *Stahl und Eisen,* v. 69, Dec. 22, 1949, p. 948-958.

Surveys stresses applied to the wire in the production of the needles and to the finished needles in the sewing operation. Composition, treatment, and properties of suitable needle steel. Methods of testing the steel. (F28, T10, CN)

67-F. Sources of Loss in Production of Sheets of the Al-Cu-Mg Alloy "Cu 30". (In German.) Franz Klein. *Metall,* v. 4, Feb. 1950, p. 54-55.

Causes of scrap based on experiences of three rolling mills. Compositions were as follows: 3.1-3.3% Cu; 0.6-0.7% Mn; 0.3-0.5% Fe; 1.3-1.4% Mg; 0.4-0.5% Si; remainder, Al. (F23, Al)

68-F. Rolls and Rolling. Parts XII and XIII. E. E. Brayshaw. *Blast Fur-*

nace and Steel Plant, v. 38, Feb. 1950, p. 196-206; Mar. 1950, p. 322-330.

Feb. issue: Roll-pass diagrams for flat sections. Spreads and fillets, the step roll, edging-pass alignment, and the fluted square. Mar. issue: Various flat products. (To be continued.) (F23)

69-F. Fast Heating Improves Forgeability. Charles A. Turner, Jr. *Steel,* v. 126, Mar. 20, 1950, p. 76-79, 103-104, 106.

Easier metal flow, resulting in 23% deeper penetrations in steel heated rapidly by the radiant gas method, is one of the unexpected results obtained from recent laboratory investigations. Reduced scale and decarburization are among the other benefits. Macrographs show influence of heating time, atmosphere, temperature, and composition on structures and penetration. (F21, ST)

70-F. Production of Forgings. Waldemar Naujoks. *Steel,* v. 126, Mar. 13, 1950, p. 106, 108, 110, 113-114, 116; Mar. 20, 1950, p. 91, 94, 96, 98, 100, 103.

Equipment and procedures. (F22)

71-F. Cold Rolling Technique; The Application of Theory and Experiment to the Practice of Rolling. 6. Methods of Calculating Roll Force and Torque Based on Theories of Rolling. Hugh Ford. *Sheet Metal Industries,* v. 27, Feb. 1950, p. 101-108; Mar. 1950, p. 197-202, 207.

Details of methods illustrated by worked examples. (Series to be continued.) (F23)

72-F. Hearth Maintenance. Charles N. Jewart. *Iron and Steel,* v. 23, Mar. 1950, p. 107-108.

As applied to batch-type regenerative furnaces and single, double, and triple-fired continuous furnaces with recuperators, in the steel mill. (F21)

73-F. (Book) **Designing With Aluminum Extrusions.** H. V. Menking. 138 pages. Reynolds Metals Co., 2500 S Third St., Louisville 1, Ky.

Breaks down advantages of the extrusion process into eight principles of design. (F24, Al)

74-F. What Price Scale; Some Ideas for Cost Cutting. Harry L. Showalter, Jr. *Steel Processing,* v. 36, Mar. 1950, p. 143-149.

Advantages of scale-free heating in the steel mill, showing possible cost savings by use of one or more of the direct-heating methods which minimize scaling: induction; high-speed gas heating; electrical heating plus protective atmosphere; and the lithium process which combines protective atmosphere with direct gas or oil-fired heating. (F21, ST)

75-F. Alan Wood Puts Hot Strip Mill in Operation. *Iron and Steel Engineer,* v. 27, Mar. 1950, p. 122-123, 126. (F23, ST)

76-F. Forty-Six Years of "Know-How" Built Into the New Colorado Fuel and Iron Rod Mill at Pueblo. *Wire and Wire Products,* v. 25, Mar. 1950, p. 211-215. (F27, ST)

77-F. Non-Ferrous Wire Manufacture in England. *Wire and Wire Products,* v. 25, Mar. 1950, p. 218-220, 246-248. Reprinted from *Metal Industry.*

Equipment and processes. Copper and Cu-base alloys are drawn into various wire forms. (F28, Cu)

78-F. Progress in the Production Forge Industry. Waldemar Naujoks. *Tool Engineer,* v. 24, Mar. 1950, p. 32-33.

Large closed die forgings and equipment for their production. Recent inspection and forging techniques and recent forging materials —Ti, Al, high-temperature alloys. (F22, Ti, Al, SG-h)

79-F. Complex Steel Parts Produced by Hot Extrusion Process. J. Sejournet. *Materials & Methods,* v. 31, Mar. 1950, p. 56-58.

Recent French extension of the hot-extrusion process to a variety of steels, which makes possible forming of alloy parts with high and uniform strength properties. (F24, ST)

80-F. Elementary Theory of Rolling. M. Gensamer. *American Institute of Mining and Metallurgical Engineers,* Institute of Metals Div., Symposium Series, Vol. 2, "Nonferrous Rolling Practice", 1948, p. 1-13.

Calculation of force and power requirements and of distribution of strains in the formed object. (F23)

81-F. Hot and Cold Rolling of Nickel and High-Nickel Alloys. Mortimer P. Buck and Norman C. Britz. *American Institute of Mining and Metallurgical Engineers,* Institute of Metals Div., Symposium Series, Vol. 2, "Nonferrous Rolling Practice", 1948, p. 33-60; discussion, p. 60-61.

Practical metallurgical aspects and equipment. (F23, Ni)

82-F. Rolling Copper and Copper Alloys. William Marsh Baldwin, Jr. *American Institute of Mining and Metallurgical Engineers,* Institute of Metals Div., Symposium Series, Vol. 2, "Nonferrous Rolling Practice", 1948, p. 63-112; discussion, p. 112-115.

Rolling of flat products. Effects of casting, annealing, pickling, scalping,

coiling, on rolling and its effects on forming, finishing, cutting, joining, etc. 74 ref. (F23, Cu)

83-F. The Rolling of Zinc. W. M. Peirce. *American Institute of Mining and Metallurgical Engineers,* Institute of Metals Div., Symposium Series, Vol. 2, "Nonferrous Rolling Practice", 1948, p. 117-127; discussion, p. 127-128.

Differences in rolling Zn from other metals; major uses. Includes table of mechanical properties. (F23, Q general, Zn)

84-F. Metallurgical Problems in Rolling Aluminum Alloys. John Alden. *American Institute of Mining and Metallurgical Engineers,* Institute of Metals Div., Symposium Series, Vol. 2, "Nonferrous Rolling Practice", 1948, p. 129-148; discussion, p. 148-151.

History; preparation of ingots for hot rolling, hot rolling, and cold rolling. Data on mechanical properties. (F23, Q general, Al)

85-F. The Hot and Cold Rolling of Magnesium-Base Alloys. G. Ansel and J. O. Betteron, Jr. *American Institute of Mining and Metallurgical Engineers,* Institute of Metals Div., Symposium Series, Vol. 2, "Nonferrous Rolling Practice", 1948, p. 153-205; discussion, p. 205-210.

Present-day practice; laboratory and development rolling experiments; future possibilities. Data on mechanical properties. 69 ref. (F23, Q general, Mg)

86-F. Rolling and Work Hardening Characteristics of Some Precious Metals. Carl H. Samans. *American Institute of Mining and Metallurgical Engineers,* Institute of Metals Div., Symposium Series, Vol. 2, "Nonferrous Rolling Practice", 1948, p. 211-235; discussion, p. 235-237.

General rolling characteristics and effects of impurities. Data on hardness. 26 ref. (F23, Q29, EG-c)

87-F. An Appraisal of Wire Products in Industry. W. F. Hodges. *American Institute of Mining and Metallurgical Engineers,* Institute of Metals Div., Symposium Series, Vol. 3, "Rod and Wire Production Practice", 1949, p. 1-5; discussion, p. 5.

History and development of wire production. Drawing and rolling processes, corrosion, and coatings. Applications in general. (F28, R general, L general)

88-F. The Production of High-Carbon Steel Wire. Carleton W. Garrett. *American Institute of Mining and Metallurgical Engineers,* Institute of Metals Div., Symposium Series, Vol. 3, "Rod and Wire Production Practice", 1949, p. 6-13; discussion, p. 13-15.

Cleaning, patenting, wire-drawing, and cold-working practices. (F28, L12, J25, CN)

89-F. The Hot Rolling and Cold Drawing of Stainless Rods and Wire. J. K. Findley. *American Institute of Mining and Metallurgical Engineers,* Institute of Metals Div., Symposium Series, Vol. 3, "Rod and Wire Production Practice", 1949, p. 16-18; discussion, p. 18-22.

Progress and difficulties involved. (F28, F27, SS)

90-F. Hot and Cold Working of Monel Rods and Wire. Mortimer P. Buck and Norman C. Britz. *American Institute of Mining and Metallurgical Engineers,* Institute of Metals Div., Symposium Series, Vol. 3, "Rod and Wire Production Practice", 1949, p. 23-30; discussion, p. 30-33.

Processes used by the Huntington Works, International Nickel Co. (F28, F27, Ni)

91-F. The Production of Copper and Copper Alloy Rods and Wire by Rolling and Drawing. Philip H. Kirby. *American Institute of Mining and Metallurgical Engineers,* Institute of Metals Div., Symposium Series, Vol. 3, "Rod and Wire Production Practice", 1949, p. 34-49; discussion, p. 49.

Various processes, the basic principles and essential machinery used. (F28, F27, Cu)

92-F. Production of Copper-Base Alloy Rod by Hot Extrusion. W. D. France and L. E. Thelin. *American Institute of Mining and Metallurgical Engineers,* Institute of Metals Div., Symposium Series, Vol. 3, "Rod and Wire Production Practice", 1949, p. 50-64; discussion, p. 64.

Theory and practice. (F24, Cu)

93-F. Fabrication of Aluminum and Aluminum Alloy Rod, Bar and Wire. W. T. Ennor. *American Institute of Mining and Metallurgical Engineers,* Institute of Metals Div., Symposium Series, Vol. 3, "Rod and Wire Production Practice", 1949, p. 65-77.

Typical equipment and rolling practices. Several important products and their uses. (F27, F28, Al)

94-F. Production of Magnesium Alloy Bar, Rod, and Wire. G. Ansel. *American Institute of Mining and Metallurgical Engineers,* Institute of Metals Div., Symposium Series, Vol. 3, "Rod and Wire Production Practice", 1949, p. 78-81.

Extrusion process; mechanical properties for the products. (F24, Mg)

95-F. Progress Resulting From Use of Direct-Current Drives for Heavy Reversing Rolling-Mill Trains. (In

German.) Hellmut Bauer. *Stahl und Eisen,* v. 70, Feb. 2, 1950, p. 90-96.

With the use of d.c. drives, the rolling operation is so much more rapid that ingots can be rolled in one heat, with resulting increased efficiency and reduced energy consumption. (F23)

96-F. Tube Quality and Output Boosted by Improved Production Processes. *Production Engineering & Management,* v. 25, Apr. 1950, p. 55-62.

"Rigidized" tubing is made from strip steel which has been deeply embossed with various designs. It is then fabricated by resistance welding. Subsequent operations include trimming or rolling, flash-butt welding, and air hammering for precision tubing. Materials are carbon, alloy, and stainless steel. (F26, CN, AY, SS)

97-F. Rolling Flats With Corrugated Passes. A. Lhermitte. *Blast Furnace and Steel Plant,* v. 38, Apr. 1950, p. 423-426. (F23)

98-F. Forging Weldless Steel Rings. James Blane. *Western Machinery and Steel World,* v. 41, Mar. 1950, p. 82-84.

Equipment and procedures. Design of the rollers, using hydraulically operated mandrels and rolls, differs from anything in commercial operation today. Rings from 50 to 2500 lb. in weight, from 8 to 76 in. o.d., and in lengths up to 20 ft., have been produced. (F22, ST)

99-F. Cold Extrusion of Steel. Merle H. Davis. *Finish,* v. 7, Apr. 1950, p. 47-48, 73.

Military interest and current progress in process developed in Germany. (F24, ST)

100-F. Automatic Gas-Fired Forge Furnace Meets Need for Versatility. James R. Ross. *Industrial Heating,* v. 17, Mar. 1950, p. 426-428, 431.

Furnace at Chevrolet Forge Div., General Motors Corp. (F22, ST)

101-F. First Pipe Leaves New Twin Mills. *Iron Age,* v. 165, Apr. 13, 1950, p. 102-103.

Picture story of two U. S. Steel subsidiary, electric-weld, pipe mills at Orange, Tex. (Consolidated Western Steel Corp.) and McKeesport, Pa. (National Tube Co.). (F26, CN)

102-F. Technical Progress in Forging Equipment. R. E. W. Harrison. *Steel Processing,* v. 36, Apr. 1950, p. 177-182.

Historical development. (F22)

103-F. Working Ductile Zirconium. E. T. Hayes, E. D. Dilling, and A. H. Roberson. *Steel,* v. 126, Apr. 17, 1950, p. 82-84, 96, 99-100.

Adaptability of Zr for stamping and drawing in the production of small parts, and its amenability to forging larger shapes, counterbalance some of the restrictions imposed by lack of suitable casting methods. How satisfactory sheet and rod can be forged and rolled at 1560° F. by protecting the metal from oxidation with an iron sheath. (F22, F23, G general, Zr)

104-F. Production of Semifinished Steel. Parts I-II. Karl L. Fetters and H. H. Hottel. *Steel,* v. 126, Apr. 10, 1950, p. 102, 105-106, 108, 111-112; Apr. 17, 1950, p. 86, 88, 90, 93.

Part I: Heating of steel ingots prior to rolling into semifinished forms. Various types of soaking-pit furnaces in use today, fuels utilized, and methods of heating. Part II: Different types of blooming mills in use today. (To be continued.) (F21, F23, ST)

105-F. Cold Rolling Mills; Considerations Involved in Their Selection. L. R. Underwood. *Sheet Metal Industries,* v. 27, Apr. 1950, p. 293-306, 308. (F23)

106-F. (Book) **Nonferrous Rolling Practice.** 237 pages. 1948. American Institute of Mining and Metallurgical Engineers, 29 West 39th St., New York. (Institute of Metals Division, Symposium Series, Vol. 2.)

Theory and practice of rolling for Ni, Cu, Zn, Al, Mg, their alloys, and some precious metals. Individual papers are abstracted separately. (F23, EG-a)

107-F. (Book) **Rod and Wire Production Practice.** 81 pages. 1949. American Institute of Mining and Metallurgical Engineers, 29 West 39th St., New York. (Institute of Metals Division, Symposium Series, Vol. 3.)

Application and production of rod and wire by hot rolling, cold drawing, and hot extrusion. Materials include high-carbon steel, heat resisting alloys, Monel, Cu, Al, Mg, and their alloys. Individual papers are abstracted separately. (F27, F28)

108-F. Production of Semifinished Steel. Part III. Karl L. Fetters and H. H. Hottel *Steel,* v. 126, Apr. 24, 1950, p. 86, 88, 90, 93.

Construction and operation of three-high blooming mills, slabbing mills, and both types of billet mills. Surface conditioning of blooms, slabs, and billets. (F23, F29, CN)

109-F. Cold Roll Forming. Elmer J. Vanderploeg. *Steel,* v. 126, Apr. 24,

1950, p. 81-84; May 1, 1950, p. 91-93.
See abstract of "Cold Roll Forming of Sheet and Strip," *American Society of Mechanical Engineers,* Paper No. 49-S-3, 1949, item 19A-136, 1949. (F23)

110-F. New Rod Baking Ovens at Seneca Wire Are Modified Flash Bakers. *Industrial Heating,* v. 17, Apr. 1950, p. 669, 670, 672, 674.
Ovens at Seneca Wire & Mfg. Co., Fostoria, Ohio, each dry 17,000 lb. per hr. of lime-dipped steel rod and aluminum rod for wire drawing. Illustrated. (F28, ST, Al).

111-F. Modern Wire Nail Manufacture: How Ryland's Have Reorganized Their Nail Works. *Wire Industry,* v. 17, Apr. 1950, p. 334-338, 341.
Equipment and procedures of British firm. Includes finishing operations. (T7, F28, CN)

112-F. Research on the Causes of Defects in Drop Forgings. (In German.) Hermann Raunaus and Paul Gruner. *Stahl und Eisen,* v. 70, Mar. 30, 1950, p. 253-264.
The five most common causes of defective forgings resulting from improper drop-forge operation. (F22, ST)

113-F. Aircraft Fabrication Revolution? Alexander McSurely. *Aviation Week,* v. 52, Apr. 24, 1950, p. 15-16.
New extrusion process which squeezes out airplane skin for wings and fuselages complete with built-in stiffeners thus creating a new semifinished material for planes. Ribbed sheet suitable for airplane wings and fuselages is produced from 75S alloy. (F24, Al)

114-F. How To Use Extrusions of Copper and Its Alloys. R. Carson Dalzell and D. C. Finley. *Product Engineering,* v. 21, May 1950, p. 108-112.
Case histories of actual products bring out design characteristics and varied applications. Table gives physical, mechanical, and working properties; applications; and nominal compositions. (F24, Q general, Cu)

115-F. Designing Light-Alloy Forgings. G. D. Welty. *Machinery* (American), v. 56, May 1950, p. 177-183.
Selection of Al and Mg alloys for forging, and important points to be considered in designing such forgings. (F22, Al, Mg)

116-F. Production of Merchant Shapes. Fred S. High. *Steel,* v. 126, May 8, 1950, p. 94, 97, 100, 102, 106.
The various types of mills in use for rolling merchant shapes, together with typical pass arrangements used for the rolling of different sections. (F23)

117-F. Rolls and Rolling; Rods. Part XIV. E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 38, May 1950, p. 529-540, 581, 583, 586.
Presents a variety of roll-pass diagrams for rods. (To be continued.) (F27)

118-F. Rolling Foil at Permanente. Wade Palmer. *Western Machinery and Steel World,* v. 41, Apr. 1950, p. 78-80.
Production of Al foil at Kaiser's new mill. (F23, Al)

119-F. From Steel Plate to 16 Inch Pipe. W. A. Connor. *Canadian Metals,* v. 13, Apr. 1950, p. 28-30.
Equipment and procedures for trimming, forming, arc-welding, finishing, and testing. (F26, CN)

120-F. Corrosion Resistant Tinplate A Product of Laboratory Design. *Canadian Metals,* v. 13, Apr. 1950, p. 38-39.
Development of improved procedures by American Can Co. Emphasizes cold-reduction process. (F23, T29, CN)

121-F. How To Control Friction and Heat in Cold Drawing. E. L. H. Bastian. *Iron Age,* v. 165, May 11, 1950, p. 77-79, 82.
Recommendations for the cold drawing of carbon and stainless steel, Cu, brass, Al, and Al alloys. (F26, F27, CN, SS, Cu, Al)

122-F. How To Make Extrusions. Anderson Ashburn. *American Machinist,* v. 94, May 15, 1950, p. 105-112.
Special report on equipment and procedures for both types of extrusion applied to miscellaneous ferrous and nonferrous metals. In one, a billet of hot metal is pushed through a die to form rod, bar, tube, or shape which is cut to length (billet extrusion). In the other, a slug is placed in a die and struck by a punch to extrude metal up into or around the punch or down through the die (impact extrusion). (F24, G5)

123-F. The Baking of Lime Coatings on Wire; Equipment Described. *Wire Industry,* v. 17, Mar. 1950, p. 257-258.
Coatings are applied to facilitate the steel wiredrawing operation. (F28, F1, ST)

124-F. Recent Practice in Tungsten Wire Manufacture. B. M. Pearson. *Wire Industry,* v. 17, Mar. 1950, p. 269-271.
Chemistry of production from WO_3, manufacture of tungsten powder, sintering, swaging, and wire drawing. Recrystallization phenomena and tabulated rupture strength and elongation percentages. (F28, H10, H15, W)

125-F. A £1,000,000 Forging Plant. *Machinery* (London), v. 76, Apr. 27, 1950, p. 591-597.

The 12-press battery at Bromsgrove Works of John Garrington & Sons, Ltd., in Britain. (F22, ST)

126-F. A Note on the Hot-Rolling of Cast Iron and an Examination of Some Rolled Cast Iron Samples of German Origin. J. W. Grant. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Apr. 1950, p. 371-375.

The literature indicates that rolled cast iron has many attractive physical properties, but as far as is known the process has never passed the experimental stage. In German experiments, some lengths of rolled strip and bar were examined and four pieces of rod which had been rolled to various degrees of reduction were obtained for further examination and for verification of the high level of tensile strength claimed. Results of examination of the four samples and a few notes on attempts which have been made to hot roll cast iron. 11 ref. (F23, CI)

127-F. Die Sinking for Drop Forging. Part VIII. Corner Radii, Fillets and Draft Angles. John Mueller. *Steel Processing,* v. 36, May 1950, p. 234-237.

Diagrams and tables show design principles. (To be continued.) (F22, ST)

128-F. Controlled Heating for Rolling. W. H. Dailey, Jr. *Iron and Steel Engineer,* v. 27, May 1950, p. 108-110.

Advantages and variations applicable to high and low-speed heating. (F23)

129-F. New Aluminum Extrusion Process May Simplify Aircraft Construction. *Steel,* v. 126, May 29, 1950, p. 63.

Improved mass-production methods and considerable savings in manufacturing and materials costs are seen in method for producing skin and skin-stiffening elements as one unit. (F24, T24, Al)

130-F. Extruded Aluminum Sheet With "Built-In" Reinforcement. *Modern Metals,* v. 6, May 1950, p. 30.

Reynolds' new process for extruding integrally stiffened aircraft skin. (F24, T24, Al)

131-F. Application of Logarithmic Strain Ratios to Tube Drawing. Jean Tranier. *Metal Treatment and Drop Forging,* v. 17, Spring 1950, p. 11-12; discussion, p. 13-14.

Method for application of logarithmic strain ratios to the cold drawing of duralumin tubes. Includes commentary by E. Voce, who suggests a modified version of the chart. (F26, Al)

132-F. Steel Sheet and Strip Manufacture. J. Lomas. *Machinery Lloyd.* (Overseas Edition), v. 22, Apr. 29, 1950, p. 91-93, 95, 97.

Preparation of the slabs for rolling. Various problems in hot and cold rolling of steel. Various types of rolling mills for the different operations. Heat treatment of the rolled materials. (F23, ST)

133-F. Large Forgings. (In Czech.) Jiri Novak. *Hutnické Listy,* v. 5, Jan. 1950, p. 10-17.

Various problems encountered in production of large steel forgings. Includes testing and inspection methods. (F22, ST)

134-F. Improving the Production of Crankshafts for Large Piston Engines. (In German.) Friedrich Wilhelm Nierhaus. *Stahl und Eisen,* v. 70, Apr. 27, 1950, p. 372-375.

A new "ring-forging" process for producing cams on crankshafts that results in orientation of the structure in the direction of greatest stress. (F21, T25, ST)

135-F. A Note on the Optimum Shape of Wire-Drawing Dies. (In Polish.) M. Schneider. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 1, No. 3, 1949, p. 213-231.

Theoretical principles were studied in order to standardize the shapes and sizes of sintered-carbide wire-drawing dies. Formulas are developed. 13 ref. (F28)

136-F. Calculation of Rolling-Mill Roll Pressure. (In Polish.) Z. Wusatowski. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 1, No. 3, 1949, p. 233-290.

A comprehensive treatise in four parts: Basic principles of plastic deformation; theoretical calculation of roll pressure; empirical calculation of roll pressure; and calculation of roll pressure from roll flattening and tension. The various methods are critically analyzed and typical results compared. 176 ref. (F23)

137-F. A Photoelastic Dynamometer for Rapidly Varying Forces. E. Orowan, F. H. Scott, and C. L. Smith. *Journal of Scientific Instruments,* v. 27, May 1950, p. 118-122.

Dynamometer consists of a glass slab upon which the force acts, placed between crossed polarizers; the intensity of the transmitted light is a measure of the force. It

has been used for recording the variation of pressure over the area of contact in rolling mill research. Compared with piezoelectric methods, it has the advantages of stability and of applicability to moving components without the necessity of using slip-rings. (F23, S18)

138-F. Cold Drawing. I and II. L. Sanderson. *British Steelmaker,* v. 16, Mar. 1950, p. 128-131; Apr. 1950, p. 184-187.

March installment: Pickling and cold drawing of steel rods, bars, or coils. April: Cold drawing of wire. (To be continued.)
(F27, F28, L12, ST)

139-F. Welding Speeds Production of Large Diameter Pipe. *Industry & Welding,* v. 23, July 1950, p. 30-32.

Production of 26-36-in. steel pipe by National Tube Co., McKeesport, Pa. Includes rolling and forming. (F26, CN)

140-F. New Extrusion Process Offers Product Improvement. *Production Engineering & Management,* v. 25, June 1950, p. 62.

Method developed for fabrication of ribbed sheeting of high strength and light weight for aircraft. (F24, T24, Al)

141-F. Pass Design of Angular Sections. Ross E. Beynon. *Iron and Steel Engineer,* v. 27, June 1950, p. 53-74.

Section rolling for a wide variety of shapes. (F23)

142-F. Electric Weld Tube Mill Goes Into Production at National Tube Co.'s McKeesport Works. *Iron and Steel Engineer,* v. 27, June 1950, p. 120-122.

Forming and welding equipment and procedures. (F26, CN)

143-F. Wire as an Engineering Material. N. Bruce Bagger. *Materials & Methods,* v. 31, June 1950, p. 75-82.

Basic characteristics of wire and the ways in which it can be worked and fabricated. Principal properties of the many different wire materials, and a number of typical applications to illustrate the versatility of wire as an engineering material. (F28, T general)

144-F. Overhead Radiant Heat Aids Axle Forging. Herbert Chase. *American Machinist,* v. 94, June 26, 1950, p. 73-76.

Conveyerized forging line at Ford's Canton plant which gets the furnaces up in the air to provide cooler working areas and a more compact layout. (F22, T21, ST)

145-F. Efficient Wrench Forging. Thomas A. Dickinson. *Steel Processing,* v. 36, June 1950, p. 285-287.

Two very different, yet related, forging techniques, by which a pair of California manufacturers produce hand tools, such as box and open-end wrenches. The first is Plomb Tool Co., where Erie board hammers are used; and the second is Thorsen Tools, where a pair of 100-ton punch presses are used in collaboration with an Acme forging machine and six automatic screw machines. (F22, G2, G17, T6, ST)

146-F. New Sheet for Fabricators. *Western Machinery and Steel World,* v. 41, June 1950, p. 81.

Radically different Al sheet for light metal fabricators announced by Reynolds Metals Co. embodies integral T-shaped stiffeners on one side. The sheet is produced by extrusion. (F24, Al)

147-F. Fundamentals of the Working of Metals. Part XII. Definitions of Terms Used in Processing and Fabricating of Metals. George Sachs. *Modern Industrial Press,* v. 12, June 1950, p. 6, 8.

(F general, G general)

148-F. American Wire Mill Equipment; A Review and Translation. Kenneth B. Lewis. *Wire and Wire Products,* v. 25, June 1950, p. 495, 532-533. From article by Heinz Hoehle, *Stahl und Eisen,* v. 70, Jan. 19, 1950, p. 41-51.

Mr. Hoehle visited some American mills in 1939 and again in 1949 and his observations are interesting in that they show clearly the progress of a decade. (F28)

149-F. An Examination of Modern Theories of Rolling in the Light of Rolling Mill Practice. N. H. Polakowski. *Sheet Metal Industries,* v. 27, May 1950, p. 389-399, 402.

Contradictions and discrepancies between theory and practice. Experimental data from the literature are correlated and charted. (To be continued.) (F23)

150-F. Cold Drawing. III. L. Sanderson. *British Steelmaker,* v. 16, June 1950, p. 310-313.

Wiredrawing dies, problems involved in the reduction process, and practical advantages of cold drawn steel. Also galvanizing and patenting. (To be continued.)
(F27, F28, J25, L16, ST)

151-F. New Gary Mill Processes Both Seamless and Welded Tubing. *Steel,* v. 127, July 3, 1950, p. 94, 97-98, 100.

New unit, included in National Tube's modernization program, features continuous rolling on a mandrel and incorporates the stretch-

reducing process in 12 separately powered stands. The method is especially suited for making small-diameter tubing in long lengths at delivery speeds up to 1700 ft. per min. (F26)

152-F. Electric Welded Tube Mill Now in Production at McKeesport. *Blast Furnace and Steel Plant,* v. 38, July 1950, p. 779-782.

Includes plate bending and forming. (F26, CN)

153-F. Rolls and Rolling. Part XVI. Beams. E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 38, July 1950, p. 792-803.

Roll-pass cross sections. (F23)

154-F. Cold Extrusion of Steel. Merle H. Davis. *Ordnance,* v. 35, July-Aug. 1950, p. 31-34.

Previously abstracted from *Finish,* item 99-F, 1950. (F24, ST)

155-F. Synchronized Drives and Controls Raise Fretz-Moon Operating Speeds. *Steel,* v. 127, July 10, 1950, p. 96, 98, 101-102.

Uniformly higher quality, greater pipe-size accuracy, and interior cleanliness of product produced on Wheeling Steel's new mill are attributed to both the synchronized all-electric motor drive for the integrated forming and welding stands and an adjustable "flying saw" mechanism. (F26, CN)

156-F. Rolling Aluminum at Davenport. *Light Metal Age,* v. 8, June 1950, p. 6-9, 22-24.

Alcoa's aluminum rolling mill at Davenport, Iowa. The mill itself contains more than 6¼ million lb. of Al. (F23, T26, Al).

157-F. Contribution to the Study of Rolling Pressure. (In French.) J. Stremsdoerfer. *Revue de Métallurgie,* v. 47, Apr. 1950, p. 237-259.

A theoretical study for the case of a rectangular bar rolled between smooth cylinders. New formulas are proposed for calculation of pressure and rolling force. Results (using the above formula) are compared with those determined using Ekelund's formulas. (F23)

158-F. Rolled Magnesium-Zirconium Alloys. (In German.) Franz Sauerwald. *Zeitschrift für Metallkunde,* v. 41, Mar. 1950, p. 81-87.

Magnesium alloys, whose cast grain size has been reduced by refining with zirconium, have especially good plastic properties and are well suited for rolling, especially rolling directly as-cast without preliminary extrusion. Binary and polynary alloys have good corrosion resistance and mechanical properties.
(F23, Q general, R general, Mg)

159-F. Rapid Heating of Billets in Gas-Fired Furnaces. (In Russian.) V. F. Kopytov and P. V. Sorokin. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Feb. 1950, p. 54-58.

Furnace design and time of heating of round and square billets and sheets of medium-carbon steel up to 60 mm. thick and also pipe of low-carbon steel of up to 5-mm. wall thickness. (F21, CN)

160-F. Propagation of the Plastic-Deformation Front in Bars During Rolling in a Blooming Mill. (In Russian.) T. M. Golubev. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Mar. 1950, p. 401-406.

Depth of penetration of plastic deformation on compression in bars of large cross section, depending on compressive force, rate of rolling, and diameter of rollers. Formulas for determining optimum roller diameter. (F23, Q24)

161-F. New French Steel Plants—Details of Mills and Drives. Glenn E. Stolz. *Iron Age,* v. 166. July 13, 1950, p. 96-97.

Emphasis on blooming, hot-strip, and other rolling mills—also pickling facilities. (F23, L12, ST)

162-F. Aluminum Wire—Its Fabrication and Uses. C. J. Beneke. *Wire and Wire Products,* v. 25, July 1950, p. 571-573.

Alloy selection and fabrication, dies, lubricants, methods and equipment, annealing and solution heat treating, straightening, and uses. Typical mechanical properties are tabulated. (F28, Al)

163-F. Carbide Wire Drawing Dies—Bearings Vs. No Bearings. J. O. Tompkins. *Wire and Wire Products,* v. 25, July 1950, p. 576-578.

Results of research on drawing tire-bead wire in carbide dies with and without "bearings". Bearings were found to produce superior results. (F28, ST)

164-F. Application and Use of Lubricant Coatings. Floyd M. Hauger. *Wire and Wire Products,* v. 25, July 1950, p. 579-581, 610.

New coating compound that eliminates both the use of lime and lubricants in the die box in ferrous wire drawing. Composition is not given. (F28, Fe)

165-F. The Manufacture of Coaxial Cable. W. E. Hammersla. *Wire and Wire Products,* v. 25, July 1950, p. 582-583, 598, 600, 602-603.

Process includes drawing of copper rod and tape and wrapping

stainless-steel tape around a copper tube. (F28, T1, SS, Cu)

166-F. Cross Roll Straightening Machine. *Product Engineering,* v. 21, July 1950, p. 96-97.

Machine removes bends and kinks from 2-in. bars and tubes at the rate of 7,000 20-ft. pieces per 8-hr. day. Since rolls do the straightening, power consumption is about 50% less than for machines having rigid guides. (F29)

167-F. McLouth: Unconventional Strip Supplier. *Steel,* v. 127, July 17, 1950, p. 62-63.

Trenton plant takes an ingot from the soaking pits, runs it through a bloomer down to 5/8 in., then a reversing mill without reheating to squeeze it to automotive gages. (F23, CN)

168-F. U. S. Sets Up Proving Ground for Forging Techniques. *SAE Journal,* v. 58, July 1950, p. 61-62. Based on "Military Significance of Large Pressure Forgings", by K. B. Wolfe.

Equipment of government-equipped and industry-operated facility for developing forging techniques being set up at Adrian, Mich., with the backing of the U. S. Air Force. The forging will be done in heavy vertical hydraulic forging presses obtained from Germany. (F22)

169-F. Cold Rolling Technique; The Application of Theory and Experiment to the Practice of Rolling. Methods of Calculating Roll Force and Torque Based on Theories of Rolling. 6. (Series continued.) Hugh Ford. *Sheet Metal Industries,* v. 27, June 1950, p. 485-491.

Detailed calculations for a number of examples using Siebel's method. Also Ekelund's method, and tabular comparison of experimental and calculated values of roll force, using Ekelund's formula. (To be continued.) (F23)

170-F. National Tube Starts Operation of New Mills at Gary. *Iron and Steel Engineer,* v. 27, July 1950, p. 123-126, 128.

New equipment for forming, drawing, welding, pickling, and finishing. Stainless and other steel tubing is produced. (F26, ST, SS)

171-F. (Book) **The Rolling of Metals. Vol. I.** L. R. Underwood. 344 pages. Chapman & Hall, Ltd., 37 Essex St., London W.C.2, England. £2, 2s.

Mainly concerned with the forces involved in the rolling of relatively thin sheet and strip. The only important omission appears to be any mention of methods of measuring forces and other variables involved. There is a great deal of useful comparison between experiment and theory. (From review in *Metal Industry.*) (F23)

172-F. Stator Frame Rolling—A Hot Job. *Steel,* v. 127, July 24, 1950, p. 74. (F23, T25)

173-F. Fundamentals of the Working of Metals. Part XIII. Types of Failures Encountered During Metal Forming. George Sachs. *Modern Industrial Press,* v. 12, July 1950, p. 6, 8, 10.

Causes and methods of prevention. (F general, G general)

174-F. Drawbench Innovations Speed Line Production. *Steel,* v. 127, July 31, 1950, p. 65-66.

Continuous drawing, straightening, cutting, and polishing of both ferrous and nonferrous rods at a speed of 250 ft. per min. is possible with newly designed unit built by Loma Machine Mfg. Co. (F24)

175-F. Hot-Strip Rolling Mills; The Evolution of the Modern 4-High Mill. J. Malborn. *Sheet Metal Industries,* v. 27, July 1950, p. 581-594, 596.

Various types of the 4-high mill and their development. Data on gage thicknesses, percent reductions, temperature ranges, etc. (F23)

176-F. Forged Steel Rolls; A Review of Their Application and Manufacture. A. H. Waine. *Journal of the Iron and Steel Institute,* v. 165, July 1950, p. 279-286.

General application, potentialities, and advantages over chilled iron rolls. The three main groups, carbon steel, semi-hard alloy steel, and hardened steel, are dealt with separately, their methods of manufacture and particular applications in the hot and cold rolling industries. Hardenability curves show effect of soaking time and quenching temperature. Use, calibration, and maintenance of the scleroscope for determining surface hardness of rolls. Some unusual examples of failures in service. (F22, T5, Q29, J26, ST)

177-F. Machine Forging. J. Lomas. *Machinery Lloyd* (Overseas Edition), v. 22, July 8, 1950, p. 95-97.

Machine forging as distinct from hammer forging and drop forging. Points to be observed when employing this process, and some formulas for the maximum upsetting possible. Modern developments in cold forging and heat treatments for the higher carbon steels are described. (F22, ST)

178-F. 18,000-Ton Hydraulic Forging Press Housed in Massachusetts

Plant. *SAE Journal,* v. 58, Aug. 1950, p. 70-72. Based on "Required Production Facilities for Large Pressure Forgings" by George W. Motherwell.

Forging press, installed in new plant of Wyman-Gordon Co., Grafton, Mass. All tie-rods, cylinders, and other highly stressed parts are made of forged, heat treated, alloy steel. (F22, T5, AY)

179-F. Heavy Commercial Forgings. G. T. Jones. *Mechanical Engineering,* v. 72, Aug. 1950, p. 629-633.

Various types, giving details of methods and equipment for their production. (F22, ST)

180-F. Designing Low-Cost Forgings. J. J. Sloan and K. R. Denny. *Machine Design,* v. 22, Aug. 1950, p. 154-156.

Principles of design of die forgings. (F22)

181-F. Aluminum Die Forging Design for Quality and Economical Production. A. E. Favre and A. J. Orazem. *Product Engineering,* v. 21, Aug. 1950, p. 140-144.

Information is based on experience gained in solving numerous forging-design problems. (F22, Al)

182-F. Mechanical Die Cutting Breaks Production Bottleneck. A. Plimmer. *Steel,* v. 127, Aug. 7, 1950, p. 90-92.

Methods for automatic reproduction of plaster or wooden "masters" in blocks of iron and steel which are largely responsible for modern mass production of parts in precision molds and dies. (F22)

183-F. Production of Bars. C. W. Barrett. *Steel,* v. 127, Aug. 7, 1950, p. 94, 96, 98, 101, 104, 106; Aug. 14, 1950, p. 94, 96, 99-100.

Contrary to popular notion, bar mills are not confined to the production of bars. Products such as rods, billets, slabs, plates, skelp, and other material may all be rolled on a bar mill. Second installment continues description of the various types of bar mills operating today. Also typical problems encountered and their possible solutions in the rolling of special bar shapes. (F23)

184-F. A Peep Into the Crystal Ball. *Mainspring,* v. 13, Aug. 1950, p. 1-4.

Elementary discussion of the theory of ordinary and "backpull" or "reactive" wiredrawing. Theoretical advantages of the latter process and the possibility that it will replace conventional wire drawing. (F28)

185-F. Making Seam-Welded Tubing. A. I. Nussbaum. *Welding Engineer,* v. 35, Aug. 1950, p. 30-34.

Equipment and procedures of Electriweld Tube Div., Jones & Laughlin Steel Corp. Mild steel tubing in the range from ½ in. o.d. x 22 BWG to 4 in. o.d. x 10 BWG can be produced, as well as a variety of square, rectangular, and other noncircular tube shapes. Major operations are cold roll forming and electric welding. Advantages of the process. (F26, CN)

186-F. Present Status of the Art of Molybdenum Fabrication. Carl E. Swartz. *Metal Progress,* v. 58, Aug. 1950, p. 181-184.

Article is based on a survey made for the NEPA Project (Nuclear Energy for Propulsion of Aircraft). It was found that massive pieces weighing up to 1000 lb. can be produced; and that the metal is workable, hot or cold, by conventional methods. Workability, including ability to be forged; rolled, extruded, deep drawn, cold drawn, spun, welded, brazed, and surface coated at high temperatures (hot-dipped Al, cladding, enameling, and Mo disilicide coating). Work on binary alloys.
(F22, F23, G general, L general, K general, Mo)

187-F. Hot Forging of Commercial Titanium. Joseph Maltz and Vincent De Pierre. *Metal Progress,* v. 58, Aug. 1950, p. 189-191.

Commercial Ti containing 0.78% C has been hammer forged successfully between 1875 and 1450° F. with regular production equipment. Experimental drop forgings have also been produced. Work was done at U. S. Naval Gun Factory, Washington, D. C. (F22, Ti)

188-F. Production of Aluminum Sheet and Plate in Large Sizes. *Metal Progress,* v. 58, Aug. 1950, p. 193-196.

Melting and ingot casting, scalping and preheating, and hot and cold rolling, at new Alcoa plant near Davenport, Iowa. (F23, C5, Al)

189-F. Slab Slicer Eliminates Common Shear Troubles. *Steel,* v. 127, Aug. 21, 1950, p. 100, 102.

Positive control of the slab, elimination of depressing table back of the shear, quick release of sheared slab portions, and unobstructed access to the shear throat are some of the many advantages of a German-developed, open-side, up-and-down-cut slab shear currently in service at Rotary Electric Steel Co. The shear is of 700-ton capacity, capable of cutting 12 x 12-in. blooms and slabs 40 in. wide by 3½ in. thick. (F29)

190-F. Output Gains as "Bends" Go Out. *Steel,* v. 127, Aug. 21, 1950, p. 106.

Equipment for straightening cold drawn nonferrous tubing. Three sets of crossed rolls provide permanent deformation of tubing to bring about perfect straightness. (F29, EG-a)

191-F. Compression-Formed Steel Tubing Offers Close Tolerances and High Strength Properties. L. A. Karg. *Materials & Methods,* v. 32, Aug. 1950, p. 52-55.

The compression-forming process; available types, shapes, and sizes; tolerances; finish and decarburization; and mechanical properties. (F26, ST)

192-F. Extruded Metal Shapes and Their Uses. T. C. Du Mond. *Materials & Methods,* v. 32, Aug. 1950, p. 65-76.

The process, suitable shapes, advantages and limitations, costs, extrudable metals, and typical applications. Of major commercial importance are Al, Mg, and Cu and their alloys. Extrusion of steel and Ni alloys is also mentioned. (F24, Al, Mg, Cu)

193-F. Borax as a Coating for Drawing High Carbon Steel Wire. Curtis Voigtlander. *Wire and Wire Products,* v. 25, Aug. 1950, p. 656, 684-685.

Procedures and experiences of Union Wire Rope Corp., Kansas City, Mo. (F28, CN)

194-F. Wire Finishes and Trade Requirements. C. R. Mehl. *Wire and Wire Products,* v. 25, Aug. 1950, p. 657-658, 685.

Wire finishing including the use of borax compounds vs. lime coating. Deals with both ferrous and nonferrous wire. (F28)

195-F. Cold Drawing. IV-V. L. Sanderson. *British Steelmaker,* v. 16, July 1950, p. 364-367; Aug. 1950, p. 421-424.

A metallurgical explanation for the higher degree of hardness and tensile strength which a cold drawn wire possesses over the rod from which it is made. Three different methods of cold drawing tubes; also tube-drawing machines and tube-drawing dies. The cold drawing of steel sheets and the defects encountered form the concluding section. (F28, F26, G4, ST)

196-F. Welding Tubes. *Welding Journal,* v. 29, Aug. 1950, p. 657-659.

Procedures and equipment for forming and electric welding of large steel pipe at National Tube Co. (F26, CN)

197-F. Design of Forgings. *American Machinist,* v. 94, Aug. 21, 1950, p. 139, 141.

Described and diagrammed. (F22)

198-F. The Forging of Steel Anchor Chain. C. D. Linnenbank. *Steel Processing,* v. 36, Aug. 1950, p. 392-397.

(F22, T7, AY)

199-F. Fundamentals of the Working of Metals. Part XIV. General Classification of Forming Methods. George Sachs. *Modern Industrial Press,* v. 12, Aug. 1950, p. 6, 8, 42.

Includes consideration of stress distribution. (F general, G general)

200-F. Flame-Upsetting Makes Spool Studs. L. A. Gladu. *Welding Engineer,* v. 35, Sept. 1950, p. 42.

Simple procedure for manufacture of the studs which are used to anchor and separate the cross trees on telephone poles. (F22, J2, T7, CN)

201-F. Aluminum Seamless Tubing. M. F. Cook. *Mechanical Engineering,* v. 72, Sept. 1950, p. 723-726, 732.

Equipment and procedures for production of cold finished Al tubing from an extruded bloom. (F26, Al)

202-F. Huge Forming Dies Simplify Production of Welded Pipe. Ben C. Brosheer. *American Machinist,* v. 94, Sept. 4, 1950, p. 128-129.

Described, diagrammed, and illustrated. (F26, CN)

203-F. Determining Practical Forging Cost. J. J. Sloan and K. R. Denny, *Machine Design,* v. 22, Sept. 1950, p. 151-152.

Several parts which can be made either by die forging or machining. Comparative cost data for the two methods. The direction of the advantage varies with the material, design of the piece, and number of pieces required. (F22, G17)

204-F. Forging Economies Through Die Design. Lester F. Spencer. *Iron Age,* v. 166, Sept. 7, 1950, p. 99-103; Sept. 14, 1950, p. 89-91.

How to simplify die designs in order to achieve balanced-section forgings. These result in low-cost forging operations and simplify subsequent finishing and heat treating. Part II: 30 die steel types and alloy percentages. Reasons for selection and specific applications. (F22)

205-F. NBS Gets New Rolling Mill. *Iron Age,* v. 166, Sept. 7, 1950, p. 111.

New two-high 16 x 24-in. rolling mill at National Bureau of Standards is expected to facilitate greatly the preparation of metallurgical specimens. (F23)

206-F. Rolls and Rolling. Part XVII. Beams. E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 38, Aug. 1950, p. 917-927.

Roll-pass design for beams. (F23)

207-F. Rail Slitting Mills. C. W. Barrett. *Iron and Steel Engineer,* v. 27, Aug. 1950, p. 59-66; discussion, p. 66.

Includes layout and roll-pass diagrams and illustrations. (F29, CN)

208-F. New Blooming, Bar and Billet Mills of Lorain Works. A. F. Eisel. *Iron and Steel Engineer,* v. 27, Aug. 1950, p. 100-107.

Recent developments embodied in new unit. (F23)

209-F. Continuous Wire Drawing; New Barron & Crowther Machine. *Wire Industry,* v. 17, Aug. 1950, p. 657-658.

New development in non-slip wire-drawing machinery. (F28)

210-F. Alloy Steel Sheets. *Iron and Steel,* v. 23, Aug. 1950, p. 339-343.

Rolling of stainless and high speed steel sheets at Samuel Osborn & Co., Ltd., in Britain. (F23, SS, TS)

211-F. Effect of Speed, Temperature, and Kind of Rolls on Spread and Elongation in the Hot Rolling Process. (In Polish.) Z. Wusatowski and R. Wusatowski. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 2, no. 2, 1950, p. 111-122.

Improved calculation procedure. Includes extensive tables and graphs. Average error was reduced 43.6% in comparison with a previous formula described by Siebel and Osenberg (Germany, 1934). 12 ref. (F23)

212-F. Aluminum Die Forging Design Details That Promote Metal Flow. A. E. Favre and A. J. Orazem. *Product Engineering,* v. 21, Sept. 1950, p. 130-134.

Factors that influence dimensions of corner radii at section edges and of fillets at intersections and junctions of ribs and webs. Design of punch-out holes in thin webs and ribs; also design proportions for forged pockets and recesses. (F22, Al)

213-F. Standards and Formulae for Forming Aluminum. E. V. Sharpnack. *Reynolds Metals Technical Advisor,* no. 14, [1950], p. 1-2.

Some recommended standards, formulas, and working suggestions which users have found helpful. Includes table and typical worked example. (F general, G general, Al)

214-F. An Examination of Modern Theories of Rolling in the Light of Rolling Mill Practice. (Continued.) N. H. Polakowski. *Sheet Metal Industries,* v. 27, Aug. 1950, p. 677-690.

Contradictions between theory and practice. Analyzes the compression test in relation to rolling. 32 ref. (To be continued.) (F23)

215-F. (Book) **Drop Forging.** Henry Hayes. Ed. 2. Sir Isaac Pitman and Sons, Ltd., Parker St., Kingsway, London, W.C 2, England. 5s. net.

Not changed greatly since the first edition in 1923, but the illustrations have been revised and replaced fairly extensively. A chapter has been added on "Mechanical Forging Presses", and there is evidence of revision elsewhere. (From review in *Engineering.*) (F22)

216-F. Forging Die Lubrication. Walter E. Lang. *Metal Progress,* v. 58, Sept. 1950, p. 337-339.

A thin water emulsion of colloidal graphite is said to be a superior coolant and lubricant for hot-work dies. Spray nozzles, attached to the frame of the forging machine or recessed in the dies, can easily be automatically controlled. (F1)

217-F. Radiant Furnace Speeds Billet Heating. Herbert Chase. *Iron Age,* v. 166, Sept. 21, 1950, p. 100-101.

Furnace at Ford which delivers billets at a faster rate than they can be forged. Parts emerging from furnace are nearly scale-free. Little space is required and die life is high. (F21)

218-F. Forging Railroad Spikes. *Western Machinery and Steel World,* v. 41, Sept. 1950, p. 90-91.

Equipment and procedures at Bethlehem Pacific Steel Corp., Seattle, Wash. (F22, T23, CN)

219-F. Fundamentals of the Working of Metals. Part XV. Direct Compression Type Working Processes. George Sachs. *Modern Industrial Press,* v. 12, Sept. 1950, p. 6, 8, 10, 30.

Forging, rolling, extrusion, and piercing. (F22, F23, F24, F26)

220-F. Multiple Die Extrusion of Aluminum in Germany. *Modern Metals,* v. 6, Sept. 1950, p. 22-23.

From U. S. Dept. of Commerce report, "Fabrication of Aluminum in Germany", by C. F. Nagel, Jr., B. C. McFadden, and G. D. Welty. (F24, Al)

221-F. Distinctive Aluminum Ware Hand Wrought by Arthur Armour. *Modern Metals,* v. 6, Sept. 1950, p. 25-26.

Items made by resident of Grove City, Pa. (F22, T10, Al)

222-F. Quality Stainless Wire Produced in Quantity at New U. S. Steel Division. *Industrial Heating,* v. 17, Sept. 1950, p. 1508-1512, 1514, 1516, 1518, 1520, 1640.

Equipment and procedures of new mill at Waukegan, Ill., works of American Steel & Wire Co. Includes annealing, cleaning, wire drawing, cold rolling (flat wire), etc. (F28, SS)

223-F. **Seamless Tubes Now Produced at Modernized Gary Works.** *Blast Furnace and Steel Plant,* v. 38, Sept. 1950, p. 1035-1039.

Equipment and procedures. Includes stretch rolling, electric welding, annealing, etc. Stainless, carbon, and alloy steel tubing is made. (F26, ST)

224-F. **Rolls and Rolling. Part XVIII. Channels.** E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 38, Sept. 1950, p. 1050-1060.

Roll passes for production of channels by the butterfly, the beam, and the bending-up methods. Advantages and specific applications of each. (F23)

225-F. **Bent Beam Brought Back.** Ray Bloomberg. *Welding Engineer,* v. 35, Oct. 1950, p. 50-52.

Use of flame straightening to repair bridge members, propellor shafts, crankshafts, drive shafts, machinery frames, pipes, and many other items. (F29, ST)

226-F. **Stainless Steel Recording Wire.** R. E. Koontz. *Wire and Wire Products,* v. 25, Sept. 1950, p. 730-732, 763-764.

Elementary explanation of important properties. Production practice including three draws, three anneals, three coatings, exhaustive inspection, cleaning, etc. (F28, SS)

227-F. **Cold Rolled Strip.** *British Steelmaker,* v. 16, Sept. 1950, p. 468-476.

Preparation of raw material, modern cold rolling mills, gages, attainable, heat treatment, temper range, deep drawing strip, spring steel strip, inspection and control, other steel strip products, and cold rolled steel strip. (F23, ST)

228-F. **The Production of Steel Plates in Scotland.** J. A. Kilby. *Journal of the Iron and Steel Institute,* v. 166, Sept. 1950, p. 29-70.

History, with particular reference to engineering aspects. 32 ref. (F23, A2, ST)

229-F. **Electrically Welded Tubing: Its Manufacture, Properties and Applications.** W. G. Clewlow. *Transactions of the Institute of Welding,* v. 13, Aug. 1950, p. 122-127.

Diagrams, photographs, and weld-metal micrographs. Refers only to mild-steel tubing. (F26, CN)

230-F. **The Rolling of Hollow Boring-Tool Steels.** (In German.) Paul Grüner. *Stahl und Eisen,* v. 70, June 8, 1950, p. 506-509.

Several more or less unsatisfactory materials (sand, quartz, copper) have been used as fillers for the hole through the steel bar. It is proposed that the bore be filled with a core of hard Mn steel (12% Mn, 1% C) before completing the rolling operation. The Mn steel has the advantage of a very high expansion coefficient, hence the core can easily be removed from the cooled bar. (F23, TS)

231-F. **Modern Wire-Drawing Mills and Their Roll Bearings.** (In German.) Theodor Dahl. *Stahl und Eisen,* v. 70, June 22, 1950, p. 543-552. (F28)

232-F. **Forming Tubes and Hollow Shapes of NE Metals on Hydraulic Metal-Tube and Extrusion Presses.** (In German.) F. Hemmerich and M. Arenz. *Metall,* v. 4, Aug. 1950, p. 311-316.

Design and operation of equipment. Includes detailed diagrams of the equipment and its essential components. (F26, AY)

233-F. **Elastic Deformation of Rolls During Cold Rolling and Its Influence on the Rolling Process.** (In Polish.) Wojciech Nowakowski. *Hutnik,* v. 17, Jan.-Feb. 1950, p. 7-10.

The deflection of rolls in cold rolling and how it affects the rolling of metals and alloys. Includes mathematical equations. (F23)

234-F. **Technology of the Extrusion of Aluminum Alloys.** (In Polish.) Jan Figiel. *Hutnik,* v. 17, Mar.-Apr. 1950, p. 49-53.

Effects of chemical composition and microstructure. Derives equations expressing the relationship of extrusion pressure to extrusion resistance. Charts of extrusion resistance vs. temperature for four Al alloys. (F24, G5, Al)

235-F. **Forging Ahead at Utica.** Warren Walker, Jr. *Instrumentation,* v. 4, 3rd qtr. 1950, p. 11-12.

Precision controls speed precision forging of jet-engine parts at Utica Drop Forge & Tool Corp., Utica, N. Y. (F22, S)

236-F. **The Blacksmith's Paradox.** (In French.) Pierre Vernotte. *Chaleur & Industrie,* v. 31, July 1950, p. 163-172.

Attempts to explain the mechanism of manual methods of production and heat treatment of forgings by blacksmiths throughout the ages. All phases are analyzed from the theoretical viewpoint. No "paradox" actually exists. (F22, J general, ST)

237-F. Preliminary Forging of Certain Special Steels Before Rolling. (In French.) L. Faure. *Revue de Métallurgie*, v. 47, July 1950, p. 487-510; discussion, p. 510.

Investigated, indicating when such preliminary forging is required. Methods and equipment for forging and cold working. Typical structures. 15 ref. (F22, AY, SS)

238-F. New Italian Wire-Drawing Machine; Block Control Features of the "Mill". *Wire Industry*, v. 17, Sept. 1950, p. 747-748.

(F28)

239-F. Selecting Rods of the Proper Size for the Rod Mill. Fred C. Bond. *Engineering and Mining Journal*, v. 151, Oct. 1950, p. 85.

Estimation procedure in which an empirical equation is used. (F27)

240-F. Reducing Process Makes Precision Tubing. H. E. Linsley. *American Machinist*, v. 94, Oct. 2, 1950, p. 92-93.

Tube Reducing Corp.'s "Rockrite" process consists of feeding tube over a tapered mandrel between a pair of reciprocating dies with a tapered annular groove of special design. (F26)

241-F. A Trainload of Pipe a Day From a California Plant. Charles O. Herb. *Machinery* (American), v. 57, Oct. 1950, p. 145-152.

Equipment and procedures of Basalt Rock Co., Napa, Calif. Pipe produced is in sizes of 8⅝ to 30 in. o.d. Includes cutting, plate bending, press forming, resistance welding, straightening, hydrostatic testing, and visual inspection. (F26, CN)

242-F. Electrical Metallic Tubing Rolled and Resistance-Welded. *Machinery (American)*, v. 57, Oct. 1950, p. 184-185.

Procedures and equipment of Spang-Chalfant plant of National Supply Co. The tubing is steel. (F26, ST)

243-F. Revolution in Copper and Brass Mills. Daniel R. Hull. *Metal Progress*, v. 58, Oct. 1950, p. 472-477.

Fundamental changes which have taken place in American brass mills since 1940. Substitution of mechanical-handling devices for expensive labor has resulted in faster work on bigger units and a better product. Includes casting, extrusion, rolling, and making of tubing, rod, and wire. (F general, Cu)

244-F. Designing Light Alloy Forgings. G. D. Welty. *Machinery* (London), v. 77, Sept. 28, 1950, p. 347-350.

Previously abstracted from *Machinery* (American). See item 115-F, 1950. (F22, Al, Mg)

245-F. (Book) **Grundlagen des Walzverfahrens** (Fundamentals of the Rolling Process). H. Hoff and Th. Dahl. 296 pages, 1950. Stahleisen, Dusseldorf, Germany. 29 German marks.

A good primer on the metallurgy and mechanics of the rolling of metals. History of the rolling process; pouring of ingots and defects of ingots; properties of steel as affected by composition, temperature, rate of heating, heat treatment, effect of deformation and of cold deformation; similar properties of other deformable metals; plastic deformation of metals; the rolling process (about one-quarter of the book, including flow of material in rolling, distribution of longitudinal and lateral stresses, theories of Siebel and of von Karman, Trinks' charts, effects of compression, spreading of rectangular sections, forward slip, change of properties and of grain structure during rolling); roll train resistance; the finished product; bibliography and index.—W. Trinks. (F23, Q24)

246-F. Plant Makes Its Own Welded Tubing. *Iron Age*, v. 166, Oct. 19, 1950, p. 86.

Fast and continuous production from coiled steel strip stock at Chevrolet-Flint Mfg. Div., General Motors Corp. At the welding station, the longitudinal joint is seam welded as it passes under a welding wheel turning at a speed equal to the rate of tube travel. (F26, ST)

247-F. The Production and Applications of Copper-Base Alloy Wire. W. D. France, W. L. Wells, and W. E. Johnson. *Wire and Wire Products*, v. 25, Oct. 1950, p. 836-839, 936.

Compositions, properties, applications, and fabrication procedures. Emphasizes practice of Scovill Mfg. Co., Waterbury, Conn. Includes annealing, pickling, finishing, and inspection. (F28, Cu)

248-F. Processing of Aluminum Alloys With Tungsten Carbide Dies. C. E. Hughes and E. T. Miller. *Wire and Wire Products*, v. 25, Oct. 1950, p. 885-886, 902-904.

Recommended procedures for various cold forming operations, such as hydraulic extrusion, wiredrawing, impact extrusion, cold heading. Design of tungsten carbide dies for these operations. (F24, F28, G5, G10, T5, Al, C-n)

249-F. Ultra-Fast Mill Helps Meet Strip Shortage. D. I. Brown. *Iron Age*, v. 166, Oct. 26, 1950, p. 67-70.

McLouth Steel's new hot rolled strip mill which features single con-

version of ingot into strip using a 4-high reversing hot mill. The bloomer is one of the fastest breakdown mills in the world. Includes pickling facilities. (F23, L12, CN)

250-F. Roll-Edging Forging Blanks Saves Steel. *Steel,* v. 127, Oct. 30, 1950, p. 61.

How "single-squeeze" shaping speeds production of forged automotive parts while making possible material savings up to 15%. (F22, ST)

251-F. Continuous Seamless Pipe Mill Employs One-Diameter Billet. John L. Young. *Steel,* v. 127, Oct. 30, 1950, p. 78, 80.

New mill of National Tube Co. permits production of seamless pipe in multiple lengths and at substantially constant tonnage regardless of diameter or wall thickness. (F26, ST)

252-F. The Cornell Forge Company; Efficiency in Light Forgings Production. *Steel Processing,* v. 36, Oct. 1950, p. 499-503.

Work includes carbon, alloy, stainless steel and Monel metal forgings of 1 oz. to 15 lb. weight. (F22, ST, Ni)

253-F. Cold Rolling of Tinplate. G. E. Stoltz and J. W. Brinks. *Iron and Steel Engineer,* v. 27, Oct. 1950, p. 69-77; discussion, p. 77-88.

Special tests were made on operation of a modern high-speed mill at Weirton Steel Co. Graphic records were obtained of kilowatt input to the motor-generator sets, motor armature amperes, voltage, speed, roll pressure of each stand, as well as tension between stands and strip thickness out of No. 1 and No. 5 stands. (F23, CN, Sn)

254-F. Strip Rolling Mill. *Engineer,* v. 190, Oct. 6, 1950, p. 345-347.

British-built four-stand tandem strip rolling mill, designed for the high-speed cold rolling of high-carbon and stainless steel strip. (F23, ST, SS)

255-F. Plastic Deformation of Metals During Drawing and Wire Drawing; Effects of Die Design and Miscellaneous Factors on Mechanical Properties of the Products. (In French.) J. Navarro. *Revue de Métallurgie,* v. 47, Aug. 1950, p. 601-612; discussion, p. 612-613.

Results of a comprehensive experimental and theoretical study. The experiments were performed on electrolytic Cu wires, but the results have been found to be applicable to other metals and alloys. Serious defects caused by shape of the die; effect of shape of die on drawing force required and on mechanical properties; and effect of degree of elongation and rate of drawing on the same factors. 26 ref. (F28, Q general)

256-F. Cold Working of Metals Simplified. Horace C. Knerr. *Metal Treating,* Sept. 1950, p. 9.

Lead-coating process developed by Metlab Co., whereby repeated annealing operations, with their accompanying pickling, rinsing, relubrication, and much handling, are eliminated, in the manufacture of steel parts which require a series of severe cold working operations through presses, draw benches, etc. Lubricating effect permits heavy reductions without reannealing and without rupture. (F1, G21, ST)

257-F. Standard Belgian Mill Adapted for South American Use. E. C. Peterson. *Steel,* v. 127, Nov. 6, 1950, p. 96, 98, 101.

New Chilean mill is virtually a "jack-of-all-trades" unit producing angles, flats, narrow strip, skelp, and rods with a minimum of hand labor, and at a rate commensurate with the country's needs. (F23, F27, ST)

258-F. Production of Aluminum Foil. *Light Metal Age,* v. 8, Oct. 1950, p. 14-15.

Picture story at Kaiser Permanente plant, moved from its original site in Germany to Moss Landing, Calif. Includes rolling and annealing. (F23, J23, Al)

259-F. Rolls and Rolling. Part XIX. Channels. E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 38, Oct. 1950, p. 1174-1182.

Roll-pass diagrams. (F23)

260-F. Continuous Bull Block Operation Speeds Output of Copper Tubing. *Steel,* v. 127, Nov. 13, 1950, p. 106.

Pointing and shearing of the tubing during processing eliminates much of the time usually lost in conventional drawing practice. (F26, Cu)

261-F. Extruding Magnesium Alloys. G. L. White. *Canadian Metals,* v. 13, Oct. 1950, p. 34-35, 37.

Magnesium extrusion plant of Dominion Magnesium, Ltd., Haley, Ontario, Canada. (F24, Mg)

262-F. Aluminium-Sheet Production. *Aircraft Production,* v. 12, Sept.-Oct. 1950, p. 279.

Northern Aluminium Co.'s continuous strip-rolling mill at Rogerstone in England. (F23, Al)

263-F. Seamless Non-Ferrous Tube Production. A. D. Wilks. *Transactions of the Indian Institute of Metals,* v. 1, June 1948, p. 71-91.

Includes history, melting and casting, extrusion, and drawing. (F26, EG-a)

264-F. Results of Structural Changes in a Continuous Bloom-Heating Pusher Furnace. (In German.) Oskar J. Stebel. *Stahl und Eisen,* v. 70, Sept. 14, 1950, p. 836-840.

New design of furnace used preliminary to the rolling operation, which resulted in 40% savings in fuel. Operating data and heat-control system. (F21)

265-F. Materials, Rolling Technique, and Considerations of Design in the Production of Aluminum Foils. (In German.) Otto Emicke. *Metall,* v. 4, Oct. 1950, p. 407-416.

Production methods. Compares properties of 99.5 and 99.99% Al. (F23, Al)

266-F. Chilean Mill Uses Novel Bloom Shear. *Iron Age,* v. 166, Nov. 16, 1950, p. 96.

Above shear has a hydraulically operated hold-down gag which automatically adjusts both itself and the stroke of the depressing table to the thickness of the slab. Advantages are a clean square cut and reduction of maintenance costs on both the depressing and shear approach tables. (F29)

267-F. Continuous Rolling of Aluminium: Northern Aluminium Company's New Strip Mill at Rogerstone. *Metal Industry,* v. 77, Sept. 22, 1950, p. 143-146; Sept. 29, 1950, p. 167-169. (F23, Al)

268-F. A Continuous Aluminium Strip Mill; Modern Production Methods at Rogerstone. *Metallurgia,* v. 42, Oct. 1950, p. 223-232.

See also above abstract, item 267-F. (F23, Al)

269-F. Work and Power in the Rolling Process. (In Polish.) Z. Wusatowski *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 2, no. 3, 1950, p. 213-267.

Extensive theoretical and mathematical analysis. Various methods of calculation. Practical ways of calculation of work and power in hot and cold rolling process. Effect of tension of metal by coilers. Many diagrams published in foreign literature and numerous examples of practical application and calculation. 51 ref. (F23)

270-F. Flame Finishing To Remove Defects From Steel Ingots and Billets. (In Russian.) A. I. Brodskii. *Avtogennoe Delo* (Welding), v. 21, Aug. 1950, p. 17-20.

Different types of defects appearing in finished and semifinished articles after cold and hot working, rolling, and welding, and methods for minimizing them by flame treatment. (F21, G22, CN)

271-F. Nature of the Mechanism of Fracture of Highly Alloyed Metals During Upsetting. (In Russian.) M. V. Rastegaev. *Izvestiya Akademii Nauk SSSR,* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Aug. 1950, p. 1183-1188.

Experimentally investigated for a high-alloy steel heated to 400-1270° C. and then hot worked during cooling. It was found that the direct cause of fracture of brittle high-alloy steels during upset forging is phase transformation of overheated portions in shear planes formed by nonuniform deformation. (F22, Q26, AY)

272-F. Portable Ingot Stripper Offers Flexibility. *Iron Age,* v. 166, Nov. 23, 1950, p. 71.

250-ton stripper which can be suspended from a crane hook. It is in use at Rotary Electric Steel Co., Detroit. (F21)

273-F. Rolls and Rolling. Part XX. Channels. E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 38, Nov. 1950, p. 1323-1326, 1328-1329.

Roll-pass designs for different types of channels, when the bending method is used. (F23)

274-F. Arvida Mill Is Fully Automatic and Repeating. H. Jones. *Iron Age,* v. 166, Nov. 30, 1950, p. 72-75.

Aluminum Co. of Canada's new Belgium rod mill which combines the advantages of the free-looping mill with those of the continuous mill, at low initial investment. Automatic and simple operation enabled green crews to produce at higher than rated capacity in less than 6 months. (F27, Al)

275-F. Automatic Self-Centering Rolls and Pulleys. E. T. Lorig. *Iron and Steel Engineer,* v. 27, Nov. 1950, p. 57-67.

Tracking and aligning problems encountered in the processing of cold, wide, light-gage, flat, metal strip in continuous lines for pickling, cleaning, shearing, electrolytic tinning, continuous galvanizing, etc. Results of extensive study by Carnegie-Illinois Steel Corp. have led to development of self-centering rolls. Schematic diagrams show the effects of various roll contours on the tendency of the strip to get out of alignment. (F23, L12, L15, L17)

276-F. Chile Builds a New Merchant Mill. E. C. Peterson. *Iron and Steel Engineer,* v. 27, Nov. 1950, p. 88-92. (F23, ST)

277-F. New Bar Production Facilities at Bethlehem's Lackawanna Plant. George A. Henderson. *Iron and Steel Engineer,* v. 27, Nov. 1950, p. 93-100.
(F23, ST)

278-F. One Man Bull-Block Developed for Cold Draw. *Iron and Steel Engineer,* v. 27, Nov. 1950, p. 136, 138.
New unit completely equipped for drawing ferrous and nonferrous tubes and rods. One of the unusual features is that the push pointer and shears are an integral part of the unit. (F26, F27)

279-F. The Use of Roller Bearings in High-Temperature Thin-Sheet Rolling Mills. (In German.) Wilhelm Krämer. *Stahl und Eisen,* v. 70, Oct. 12, 1950, p. 925-929.
Reasons for use and practical suggestions for design. (F23)

280-F. The Use of Resilient Pads on Forging Hammers. Francis A. Westbrook. *Steel Processing,* v. 36, Nov. 1950, p. 565-566, 586.
Use of pads to minimize damage to surroundings caused by impact shock and vibration. (F22)

281-F. Die Sinking for Drop Forging. (Concluded.) Part X. "Trimmer Dies". John Mueller. *Steel Processing,* v. 36, Nov. 1950, p. 567-569, 582-583.
(F22)

282-F. Tube Reducing Machine Has Novel Die Arrangement. *Product Engineering,* v. 21, Dec. 1950, p. 100-101.
Recently redesigned Rockrite tube reducing machine employs a unique rocking-die principle to produce accurately sized tubing from less accurate hot-formed tube. The dies rock back and forth to knead the work over a specially formed mandrel. This kneading cold works the metal in compression and reduces it to a smaller diameter tube with much greater length. (F26)

283-F. Advantages of Cold-Drawn Pinions. Edbridge H. Rathbone. *Product Engineering,* v. 21, Dec. 1950, p. 114-116.
Three methods of making small pinions are by cutting the teeth, by extruding, and by cold drawing of rods into finished pinion rod. If the metal has good cold working properties, the last process produces pinions of the highest durability and load-carrying capacity, and to an accuracy equal or better than cut teeth. Comparative data on hardness gradient from center to surface are charted for AISI 1112, phosphor bronze, and brass. Comparative durability of cold drawn and cut pinions of the same metals. (F27, Q29, T7, AY, Cu)

284-F. French Building Two Continuous Hot Strip Mills. *Steel,* v. 127, Dec. 11, 1950, p. 110, 112.
Includes cold reduction, pickling, and annealing. (F23, J23, L12, ST)

285-F. Press Forging. *Automobile Engineer,* v. 40, Nov. 1950, p. 363-369.
Equipment and production methods employed by J. Garrington & Sons, Ltd., in Britain. (F22, ST)

286-F. The Forging of Metals; Its Effect on Their Physical Characteristics. J. Lomas. *Machinery Lloyd* (Overseas Edition), v. 22, Nov. 11, 1950, p. 84-89, 91, 93, 95.
(F22)

287-F. Slab Pre-Heating Furnaces; New Installation at Rogerstone. *Metal Industry,* v. 77, Nov. 17, 1950, p. 199-200.
New plant of Northern Aluminum Co., Ltd., in Britain. The Al alloy slabs are electrically preheated prior to rolling. See also items 267-F and 268-F, and 288-F through 292-F, 1950. (F23, F21, Al)

288-F. Continuous Rolling Mill of the Northern Aluminium Company at Rogerstone. *Engineering,* v. 170, Sept. 29, 1950, p. 265-267; Oct. 6, 1950, p. 281-283; Nov. 10, 1950, p. 337-340.
See also items 267-F and 268-F and 287 through 292-F, 1950. (F23, Al)

289-F. Aluminium Strip Mill at Rogerstone. *Engineer,* v. 190, Sept. 29, 1950, p. 319-322; Oct. 6, 1950, p. 351-353; Nov. 17, 1950, p. 459-461; Nov. 24, 1950, p. 487-489.
See items 267 and 268-F, and 287 through 292-F. (F23, Al)

290-F. Continuous Strip Mill for Aluminium. *Machinery* (London), v. 77, Nov. 9, 1950, p. 449-453.
See also items 267 and 268-F, and 287 through 292-F. (F23, Al)

291-F. Rogerstone. *Light Metals,* v. 13, Sept.-Oct. 1950, p. 472-493.
See also items 267 and 268-F, and 287 through 292-F. (F23, Al)

292-F. The Commonwealth's Largest Aluminium Rolling Mill. Northern Aluminium's Venture at Rogerstone. *Mining Journal,* v. 235, Nov. 17, 1950, p. 479-481.
See also items 267 and 268-F, and 287 through 291-F. (F23, Al)

293-F. Relations Between Roll-Force, Torque, and the Applied Tensions in Strip-Rolling. Rodney Hill. *Institution of Mechanical Engineers, Proceedings* (Applied Mechanics Div.), v. 163, W.E.P. No. 58, 1950, p. 135-140; discussion, p. 144-148.
Expressions are derived for roll-force and torque in strip-rolling under tension, as functions of pressure distribution on the rolls and

of radius of the deformed arc of contact. Conclusions are confirmed by experiments on annealed mild steel strip. Theory indicates also that roll-force decreases linearly with both front and back tensions. (F23)

294-F. A Theoretical Investigation of Roll Flattening. D. R. Bland. *Institution of Mechanical Engineers, Proceedings* (Applied Mechanics Div.), v. 163, W.E.P. No. 58, 1950, p. 141-144; discussion, p. 144-148.

A method of determining distortion of the roll surface when subject to a known pressure distribution. This method is then combined with a plastic-flow theory of rolling to determine the shape of the arc-of-contact and the pressure distribution over it when neither of these are known beforehand. Accuracy of the results is estimated to be 20%. (F23)

295-F. New Methods of Producing Fittings by Forging, Welding, and Machining. (In German.) K. Krekeler. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, Oct. 21, 1950, p. 833-836.

More efficient methods of manufacturing different types of valve parts, proposing the welding of individual sections by the submerged-melt process.
(F22, G17, K1, T7, ST)

296-F. Drawing Tests With Alloy Steel Wires Under Different Working Conditions. (In German.) Werner Lueg and Anton Pomp. *Stahl und Eisen,* v. 70, Oct. 26, 1950, p. 977-984.

Tests show that a coating of common salt used as a lubricant carrier produces superior results. Three different steels drawn by different methods, at different rates, and with different degrees of cross-sectional reduction, were tested. (F28, F1, AY)

297-F. Pointing, Shearing Part of Continuous Cycle of New Bull Block. *Iron Age,* v. 166, Dec. 14, 1950, p. 114.

How the above contribute to high production in drawing copper tubing. (F26, Cu)

298-F. Lubricant Coatings on Wire for Bolt and Rivet Manufacture. W. E. Hill, Jr. *Wire and Wire Products,* v. 25, Dec. 1950, p. 1046, 1074-1078.

Present status of industrial practice. Characteristics and advantages of a universal lubricant. (F1, ST)

299-F. Chemically Applied Coatings for the Cold Drawing of Wire. James F. Leland. *Wire and Wire Products,* v. 25, Dec. 1950, p. 1049, 1082-1084.

Processes and solutions developed by Parker Rust Proof Co., Detroit, for mild and stainless steels.
(F1, CN, SS)

300-F. Europe's Largest Continuous Strip Mill for Aluminium Opens at the Rogerstone Works of the Northern Aluminium Co. Ltd. *Sheet Metal Industries,* v. 27, Nov.-Dec. 1950, p. 893-900, 904.

See also items 267 and 268-F, and 287 through 292-F, 1950. (F23, Al)

301-F. The Rolling of Metals. Hugh Ford, *Sheet Metal Industries,* v. 27, Nov.-Dec. 1950, p. 901-904.

Discusses Vol. I of the recently published book by L. H. Underwood. (F23)

302-F. The Problem of Die Wear With Special Reference to the Performance of Sintered Carbide Dies. J. G. Wistreich. *Wire Industry,* v. 17, Nov. 1950, p. 889-892, 895-896; discussion, p. 896-897, 899.

Economic importance of this problem in the wire industry. Investigation of the nature of wear of the dies. (F28, Q9, C-n)

303-F. Progress in the Cold Working of Metals, 1929-1950. W. C. F. Hessenberg. *Metallurgia,* v. 42, Nov. 1950, p. 334-336.

A review. (F general, G general)

304-F. (Book) **The Rolling of Metals, Theory and Experiment.** Vol. 1. L. R. Underwood. 344 pages, 1950. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $6.50.

See item 171-F, published by Chapman & Hall, London. (F23)

SECTION G

SECONDARY MECHANICAL WORKING

1G. Strip Slitter Installed by Tinnerman Cuts Inventory 60%. W. A. Lloyd. *Iron Age,* v. 164, Dec. 22, 1949, p. 78-80.

Installation of a Yoder strip slitter permitted a reduction in inventory from 1,500,000 lb. of 700 sizes of steel strip to 500,000 lb. of 13 basic sizes. Construction and operation of the slitter and auxiliary equipment, including an automatic scrap-handling unit. (G15)

2G. How "Cookie-Cutters" Trim Die Costs. *Modern Industry,* v. 18, Dec. 15, 1949, p. 95-96.

Use of "dinking dies" for cutting stainless steel and duralumin parts from sheet at Boeing Aircraft. Savings as compared with use of conventional dies are large. Special heat treatment makes the cutting edges hard enough. (G2, SS, Al)

3G. Bending Prefabricated Pipe. *Industrial Gas,* v. 28, Dec. 1949, p. 8, 23. Reprinted from *Instrumentation.*

Specially designed gas-fired pipe bending furnace. (G6)

4G. Are We Slowpokes at Machining? E. J. Tangerman. *American Machinist,* v. 93, Dec. 29, 1949, p. 55-57.

Recent events which indicate wider horizons in cutting speeds. Need for fundamental research rather than "cut-and-try" in this field. (G17)

5G. Allied Press Equipment Plays Prominent Part in Airplane Production at Boeing. Howard E. Jackson. *Modern Industrial Press,* v. 11, Dec. 1949, p. 20, 22, 30.

Miscellaneous equipment for forming, bending, shearing, punching, milling, welding, heat treating, spray painting. (G1, A5)

6G. Working of Aluminum Into Domestic Wares. Walter Rudolph. *Modern Industrial Press,* v. 11, Dec. 1949 p. 38, 40.

Forming, trimming, and buffing equipment and procedures. (G general, L10, T10, Al)

7G. Metal Forming With the Marform Process. *Light Metal Age,* v. 7, Dec. 1949, p. 16, 34.

New process developed by Glenn L. Martin Co., said to result in savings up to 50%. The principal feature is precision control of the pressure curve during the forming cycle. (G4)

8G. Shape-Cutting With Electronic Tracer. W. O. Springer. *Western Machinery and Steel World,* v. 40, Dec. 1949, p. 88-90.

Multiple flame-cutting setups. (G23)

9G. An Analytical Study of Practical Machining Conditions; The Operational Efficiency of Machining Processes. A. J. Chisholm and J. P. Brown. *Machinery* (London), v. 75, Dec. 15, 1949, p. 856-864; Dec. 22, 1949, p. 891-894.

Technique for studying the efficiency of machining processes. It is possible to obtain a measure of the performance of the cutting tools used, and of the economic efficiency of the cutting conditions chosen for different machining operations. Application to milling of Nimonic heat-resisting alloy. (G17, SG-h)

10G. Measurement of Progressive Errors in Machine Tools by High-Speed Photography. C. Timms. *Machinery* (London), v. 75, Dec. 15, 1949, p. 870-873, 875; *Engineering,* v. 168, Dec. 23, 1949, p. 679-680.

Apparatus and technique. Typical results. (G17)

11G. Sintered Hard Metals Containing Titanium Carbide. E. J. Sandford. *Alloy Metals Review,* v. 7, Dec. 1949, p. 2-11.

Theories advanced to explain the

beneficial effect of titanium carbide when machining steel, manufacturing difficulties which arise when this carbide is used, and effect on physical properties and structure. Attempts to completely displace tungsten carbide by other carbides, especially titanium carbide, have failed in alloys used for metal cutting. (G17, SG-j)

12G. Cold-Worked Metals and Fatigue. Richard Saxton. *Metallurgia*, v. 41, Nov. 1949, p. 32-33.

Flow in cold drawing is due to the combined effect of direct pull and circumferential pressure induced during passage through the die. Wear at the entrance of the die causes a ring formation. Methods for eliminating this. (G4, Q7)

13G. Forging and Forming. *Steel*, v. 126, Jan. 2, 1950, p. 175-178.

Brief reviews and forecasts: Shop and Market Served Determine Press Requirements, David C. Verson. Underdrive Presses Afford Maintenance Accessibility, E. A. Irwin. Increased Interest Noted in Large Hydraulic Presses, Howard M. Hubbard. Advanced Die Design Improves Stamping and Forming, John F. Herkenhoff. New Equipment Speeds Hole Piercing, Theo. A. Wiedermann. Pension Squeeze May Raise Prices of Drop Forgings, C. H. Smith, Jr. Impression Die Forging Advances on Three Fronts, W. Naujoks. New Processes and Equipment Seen as Near Future Trend, Bryant Bannister. Trend Noted in Redesign for Stamping, John W. Higgins. Large Size Forgings Require Closer Steelmaking Controls, A. P. Spooner. High Hardness and Strengths Trend in Heavy Forgings, A. F. Finkl. Better Forging Tools—Fruits of Research, Eugene C. Clarke. Ultrasonic Testing of Forgings Gains During 1949, A. O. Schaefer. Technical Progress Opens New Markets for Hydraulic Presses, R. E. Dillon. Straight Carbon Steel of Precise Hardenability Sought, D. A. Barnes. (G general, F general)

14G. Machining. *Steel*, v. 126, Jan. 2, 1950, p. 240, 243, 246, 248, 251-252, 254, 257, 260, 262.

Long Stroke Openside Planer Uses Carbides Efficiently, H. B. Newton. Market Expanded for Precision Band Saw, Leighton Wilkie. Effort-Elimination Economics Plays Important Shop Role, Otto W. Winter. Safety and Ease of Control Simplify Operators' Jobs, W. L. Lewis. Broaching Extended as General Purpose Process, Harry H. Gotberg. Modern Systems for Lapping Make Close Fits Practical, Arthur A. Nichols. Cutting Tool Seen as Big Cost Control Factor, K. R. Beardslee. Scientific Research Speeds up Production, Orlan W. Boston. Over-Age Grinding Machines Don't Pull Their Own Weight, C. Denson Day. Gaging Facilities Keep Pace With Production Lines, Frederick S. Blackall, Jr. Economic Law Sets the Limits on Degree of Mechanization, Robert L. Giebel. "Hot Spot" Machining Boosts Per Hour Production, Sam Tour. Steel Forgings Machined at 1185 Surface Ft. per Min., Walter J. Grimm. Fast Station-Type Machines Have Palletized Fixtures, Ralph E. Cross. Pantograph Milling Machine Does Effective Cam Cutting, George Habicht, Jr. Steel Mill Rolls Are Turned On Tracer Controlled Lathes, Basically New Machine Tools Are Rare Inventions Today, Lucien I. Yeomans. Old Tools Indicate Industry Still Not at Peak Efficiency, Ralph J. Kraut. Lathes Still Our Basic Tools and We Keep Improving Them, B. N. Brockman. Counteract High Labor Costs by Machine Tool Efficiency, Kirke W. Connor. Automatic Handling of Work Is Next Thing on the Agenda, M. A. Hollengreen. Gage Makers Keep Pace With Quality Demands on Industry, Louis Polk. Interest in Tungsten Carbide Chasers Increases, Grayson M. Stickell. Maintenance Cost Is Low if Designers Pay Heed to It, J. H. Beardsley. Rapid Expansion Is Apparent in Use of Coated Abrasives, Frank J. Tone, Jr. Heating of Metal Being Cut Reduces Power Requirements, Francis J. Trecker. Stage Set for Replacement of Obsolete Machine Tools, Walter S. Praeg. Contouring Lathe Cuts Costs on Rolls for Rolling Mills, Alfred Kullman. Many Modern Machine Tools Out-Perform Oldtimers 3 to 1, Charles J. Stilwell. Carbide Punches and Dies Win Rapid Acceptance, W. G. Robbins. New Machine Tools Can Give Anything Carbides Can Take, Herbert H. Pease. Capital Equipment Sales to Be High This Year, Harry E. Conrad. (G17)

15G. Low-Cost Precision Stampings. Thomas A. Dickinson. *Steel Processing*, v. 35, Dec. 1949, p. 638-640.

Procedures and equipment. By finding new uses for war-developed aircraft tooling and gravity-rope drophammer equipment, Stainless Steel Products, Inc., is currently producing a variety of metal stampings from both ferrous and nonferrous alloys (including ¾-in. thick steel plates) with close-tolerance dimensions. (G1)

16G. Die Sinking for Drop Forging. John Mueller. *Steel Processing,* v. 35, Dec. 1949, p. 645-647.

Machines duplicate dies to a high degree of accuracy and are capable of working from a thin metal templet, or from a model made of steel, cast iron, brass, cement composition, or from a comparatively soft material such as plastic, hardwood, or plaster of paris. (G16, F22)

17G. Tool Selection Cuts Machining Costs. George T. Fraser. *American Machinist,* v. 94, Jan. 9, 1950, p. 120-123.

Key characteristics of major tool materials. (G17, SG-j, TS)

18G. Deep Drawing of Rectangular and Round Shells. William P. Von Behren. *Finish,* v. 7, Jan. 1950, p. 23-24, 70, 73.

Basic considerations relating to dies, presses, and operating practice. Emphasis is on ordinary and stainless steels. (G4, ST, SS)

19G. Blanking Sheet Metal Parts With Steel Cutting Rules. E. Carpenter. *Iron Age,* v. 165, Jan. 12, 1950, p. 51-54.

The dinking die, or steel cutting rule such as used in the printing trade, has proved effective for low-cost blanking of aluminum, magnesium, and stainless-steel sheet-metal shapes. Die construction, press methods, and applications of this cutting technique. (G2, Al, Mg, SS)

20G. A Flame Cutter. *Engineer,* v. 188, Dec. 9, 1949, p. 681.

Flame-cutting torch claimed to effect large economies in the consumption of industrial gases when cutting ferrous metals. (G22)

21G. The Production of Pointers for Dial Instruments. R. Fendrich. *Machinery* (London), v. 75, Dec. 22, 1949, p. 907-909.

Stamping procedure. (G3, T8)

22G. Machining Light Alloys. (In French.) Gaston Laval and Rene Schweyckart. *Revue de l'Aluminium,* v. 26, Nov. 1949, p. 361-369.

Effect of composition of material being machined, tool design and composition, cutting fluids. (G17, Al, Mg)

23G. Oxy-Acetylene and Oxy-Hydrogen Flame Cutting. (In French.) G. Ancion. *Revue de la Soudure; Lastijdschrift,* v. 5, no. 3, 1949, p. 137-147.

Development, present status, and future prospects. Equipment and procedures; performance data. 14 ref. (G22)

24G. The Design of Cold-Drawn Shapes. (In German.) Hermann Preussler. *Stahl und Eisen,* v. 69, Nov. 10, 1949, p. 819-824.

Factors to be considered in the design of profile-drawing dies, also operating conditions. Development of dies for different simple and complex cold-drawn pieces. (G4)

25G. Flame Cutting in the Scrap Business. (In German.) H. Jansen. *Schweissen und Schneiden,* v. 1, Nov. 1949, p. 193-196.

Methods for increasing the economy of acetylene cutting. (G22)

26G. The Processing of Non-Ferrous Sheet Metals in the Stamping Shop. (In German.) G. Oehler. *Metall,* v. 3, Sept. 1949, p. 283-288.

Directions for the cutting, bending, and deep-drawing of heavy-weight and light-weight sheet metals of different physical properties. Effects of the stamping operations on structures of the metals as well as effects of various factors on cutting speeds. 10 ref. (G1)

27G. Method for Determination of Residual Stresses Caused by Shot Peening. (In Russian.) L. M. Shkol'nik. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Oct. 1949, p. 1232-1239.

Relations between residual stresses and size of sheet, as well as hardness of the metal treated. Optimum conditions for shot peening are indicated on the basis of the proposed method. (G23, Q25)

28G. Removing Buttonhead Rivets. M. J. Harris. *Welding Journal,* v. 29, Jan. 1950, p. 51.

Procedure using the standard cutting blowpipe and nozzle. (G22)

29G. Powder-Cutting. *Welding Journal,* v. 29, Jan. 1950, p. 56.

How powder cutting solved a difficult problem in refinery construction. The inner chamber of a large catalyst tower some five stories high, proved to be 3½ in. too long. It was made of 12% Cr steel, 1 in. thick. As well as shortening the column, it was also necessary to cut eight circles in the inner chamber to allow heat to pass into the outer chamber while the entire tower was stress relieved in position. The holes were welded back after treatment. (G22)

30G. Machinability of Free-Cutting Steels Measured by New "Yardstick". *Steel,* v. 126, Jan. 16, 1950, p. 80, 82, 84.

Method and apparatus developed at Battelle Memorial Institute for Carnegie-Illinois Steel Corp., and known as the "constant-pressure lathe test". It requires only a short testing time and provides adequate reproducibility of test ratings giving machinability indices that agree closely with tool-life values for large-scale commercial machining operations. (G17, ST, SG-k)

31G. Predicting Machine Capability. Dorian Shainin. *Machine Design,* v. 22, Jan. 1950, p. 72-76.

By use of available quality control methods, performance of machine-tools may be readily predicted with accuracy and confidence. (G17, S12)

32G. Machining Corrosion-Resistant Materials. Malcolm F. Judkins. *Tool Engineer,* v. 24, Jan. 1950, p. 24-27.

Mechanical properties of the stainless steels and their effects on machinability. Recommendations for cutting, tool angles, set-ups, and machining rates applicable to these materials. Recent research on machining. (G17, SG-g)

33G. Forming High-Nickel Alloys: Drawing — Shearing — Perforating — Spinning. *Metal Industry,* v. 75, Dec. 23, 1949, p. 531-534; Dec. 30, 1949, p. 561-562.

Die materials and lubricants. Progressive steps in drawing operations and effects of design and materials on tendency to split during deep drawing. Annealing characteristics. Concluding installment: Spinning. (G general, Ni)

34G. Proceedings of Moscow Conference on Rapid Methods for Working of Metals. (In Russian.) B. G. Lyul'chenko. *Stanki i Instrument* (Machine Tools and Equipment), v. 20, June 1949, p. 1-11.

Miscellaneous fabrication processes. (To be continued.) (G general, F general)

35G. Investigation of Cutting Tools During Fine Turning of Steel. (In Russian.) B. M. Ashkinazi. *Stanki i Instrument* (Machine Tools and Equipment), v. 20, Sept. 1949, p. 9-12.

Cutting properties of basic types of cutting tools used for fine machining. Two basic shapes with two types of cutting edge were studied. (G17)

36G. Rational Dimensions of Hard-Alloy Tips for Cutting Tools. (In Russian.) E. I. Lyubomirskii. *Stanki i Instrument* (Machine Tools and Equipment), v. 20, Sept. 1949, p. 12-14.

Existing dimensions of tips require revision from the point of view of establishing a more rational relation between width and thickness. Ratios of width to thickness for different purposes. (G-17, SG-j)

37G. Method of Determination of Optimum Wear and Optimum Resistance of Tools on the Basis of Their Wear Curves. (In Russian.) N. N. Zorev. *Stanki i Instrument* (Machine Tools and Equipment), v. 20, Sept. 1949, p. 17-18.

New method. Formulas are derived and interpreted for practical application. (G17, Q9)

38G. Quantity of Heat of Cutting Withdrawn by the Cutting Tool. (In Russian.) B. T. Prushkov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 19, Sept. 1949, p. 1015-1019.

Experimental investigation established that the temperature field of cutting is nonstationary, not only at the tip, but at any point along the length of the tool. Amount of heat withdrawn under conditions of the investigation did not exceed 3.5% of the total heat of cutting. 11 ref. (G17)

39-G. Measuring Machinability on a Constant Pressure Lathe. *Iron Age,* v. 165, Jan. 19, 1950, p. 68-69.

Previously abstracted from *Transactions of the American Society of Mechanical Engineers.* See item 20B-101, 1949. (G17)

40-G. Welding Cuts Costs in Deep Drawing Front Fenders. A. B. Mooers. *Iron Age,* v. 165, Jan. 26, 1950, p. 73-76.

Fender fabrication technique, which utilizes a preformed blank of sheet steel bent and welded to near final draw size. Heating after the initial draw along with high scrap losses of the old method have been eliminated. (G4, K general, CN)

41-G. Non-Metallic Dies For Aircraft Fabrication. John Delmonte. *Aero Digest,* v. 60, Jan. 1950, p. 52-53, 97.

Properties and applications. (G1, T24)

42-G. Cookie Cutters. Ed Carpenter. *Western Machinery and Steel World,* v. 41, Jan. 1950, p. 80-81.

Use of steel cutting rules for dinking dies in manufacture of stainless steel or duralumin parts from sheet, in a manner similar to cutting cookies out of dough. (G2, Al, SS)

43-G. Three New Steels Offer Higher Machinability Rates. *Materials & Methods,* v. 31, Jan. 1950, p. 51-52.

The "E" group bessemers of Jones & Laughlin; "Ledloy" (AISI B1113 plus Pb, and produced in the open-hearth) by Ryerson; and La-Led (La Salle Steel Co.). (G17, SG-k)

44-G. Vickers-Supermarine Attacker. Part I. Naval Interceptor-Fighter in Production; Basic Manufacturing Processes; Fuselage Construction. S. C. Poulsen. *Aircraft Production,* v. 12, Jan. 1950, p. 11-18.

Equipment and methods include simplified press-tools, routing, folding, hole-punching, and rubber-die press-forming technique. Fuselage structure. (G1, T24)

45-G. For Better Machinability — E Steel. F. T. Kent. *Iron Age,* v. 165, Feb. 2, 1950, p. 79-81, 96.

New free-machining steel said to give up to 25% faster metal removal and 200% increase in tool life, plus a good surface. (G17, CN, SG-k)

46-G. Better Machinability With MX Steel. A. W. MacLaren and L. W. Oswald. *Iron Age,* v. 165, Feb. 2, 1950, p. 86-88.

New bessemer steel within the composition limits of AISI B-1113 has 45% better machinability than conventional B-1113. The principal factors responsible for improved machinability are: carbon level, silicon level, manganese level, nature of sulfide inclusions, and control checking of the product. (G17, CN, SG-k)

47-G. Savings in Flame-Cutting. J. T. Lewis, Jr. *Welding Engineer,* v. 35, Feb. 1950, p. 28-32.

Equipment selection, shop layout, handling methods, gas-supply considerations, and supervision. (G22)

48-G. Arc Cutting Scraps Turbogenerator. *Welding Engineer,* v. 35, Feb. 1950, p. 42.

Cutting up of 3000-kw. cast-iron unit. (G22, CI)

49-G. Bolt Heading and Marking Hammers. *Iron Age,* v. 165, Feb. 9, 1950, p. 90.

Combination bolt-heading and marking hammers of solid carbide for automatic bolt-heading machines make possible the elimination of separate marking operations in the manufacture of bolts, nuts, rivets, and similar products. (G10, CN)

50-G. Hot Spot Machining Found To Have No Ill Effects on Finished Part Metallurgy. L. T. Friedman. *Iron Age,* v. 165, Feb. 9, 1950, p. 71-76.

Microhardness surveys, microstructure examinations, surface analyses, and Faxfilm replicas show that localized heating for machining has no detrimental effects on hardness, surface condition, and microstructure of finished steel parts. Studies were made on bars machined at room temperatures, 600-700°, 1000°, and 1450° F. (G17, ST)

51-G. An Investigation of the Weavability of Wire With Observations on the Defects of Wire and Wire Cloth. Walston Chubb, Jr. *Wire and Wire Products,* v. 25, Feb. 1950, p. 125-129, 174-177.

Objectives of investigation, history and background material, literature review. Investigations were limited to plain-carbon steel. Production of the wire, its testing, weaving of wire cloth, weavability, and mechanical properties related to weavability. (G general, CN)

52-G. Determining Torque in Tapping. A. J. Carruthers. *Machinery* (American), v. 56, Feb. 1950, p. 149-152.

Describes method by means of which tapping torque can be sensitively measured and recorded. The torque-meter measures the torque produced as a result of the combined effects of tap design, speed, lubricants, etc., any individual factor being isolated by changing it while other conditions remain constant. (G17)

53-G. Spinning Permits Design Flexibility. *Product Engineering,* v. 21, Feb. 1950, p. 100.

Disk-shaped device used in air-conditioning equipment, and produced by spinning of various metals. (G13)

54-G. New Deep Drawing Technique. Dan Reebel. *Steel,* v. 126, Feb. 13, 1950, p. 82-83, 108.

Drawing of a 38½-in. blank of 0.105-in. thick steel into a half-tank section, 14¾ in. in diam. and 24 in. deep by method which eliminates four to six operations in addition to the washing, degreasing, and annealing usually required. (G4, ST)

55-G. The Evolution of Deep Drawing Lubricants. G. A. Cairns. *Finish,* v. 7, Feb. 1950, p. 27-29, 68, 70.

Brief history of early development work. Compounds now in use; advantages and disadvantages of each. (G21)

56-G. The Stamping Industry in 1949. John C. McComb. *Steel Processing,* v. 36, Jan. 1950, p. 22-25.

New types of equipment and procedures. (G1)

57-G. New Dinking Dies Lower Blanking Costs. Thomas A. Dickinson. *Steel Processing,* v. 36, Jan. 1950, p. 31-33.

Development of inexpensive "dinking" dies—with which both ferrous and nonferrous sheets can be precision-blanked on a limited-production basis with efficient press equipment. (G2)

58-G. Improved Drawing and Cleaning With Dry Film Drawing Compound. B. L. Smalley and L. R. Kerns. *Enamelist,* v. 26, Winter 1949-50, p. 8-11.

Advantages of use of "Dry-Film" during drawing of steel which is to be enameled. (G21)

59-G. Metal Drawing Demands Correct Lubrication. E. L. H. Bastian. *Iron Age,* v. 165, Feb. 16, 1950, p. 83-89.

Specific lubricants for press drawing Al, Mg, Cu, brass, and carbon

and stainless steels; advantages and limitations of each for individual applications. (G21, Al, Mg, Cu, CN, SS)

60-G. A Dimensional Analysis of Metal Cutting. D. C. Drucker and H. Ekstein. *Journal of Applied Physics,* v. 21, Feb. 1950, p. 104-107.

Present theories and some additional significant variables. The analysis provides a basis for the interpretation of known experimental results, and should serve as a guide for future experimental and theoretical investigations. (G17)

61-G. Bandfiling Aluminum. H. J. Chamberland. *Modern Metals,* v. 6, Feb. 1950, p. 29-30.

Equipment, operation, and potentialities of process. (G17, Al)

62-G. Inexpensive Process for Embossing Aluminum Foil. *Modern Metals,* v. 6, Feb. 1950, p. 34-35.

Oldofredi process in which wire-mesh dies are used. (G3, Al)

63-G. Bending Light-Alloy Tubes. *Light Metals,* v. 13, Feb. 1950, p. 94-97. Translated and condensed from paper by Oskar Gönner, *Eisen- und Metall Verarbeitung,* Apr. 1949.

Workshop methods. Uses and limitations of standard bending devices in relationship to tubes of various diameters, wall thicknesses and compositions. (G6, Al, Mg)

64-G. Sectional Dies Cut Costs. J. R. Paquin. *American Machinist,* v. 94, Feb. 20, 1950, p. 121-123.

Splitting the die lowers manufacturing cost of press tools and reduces maintenance expense. (G1)

65-G. The Case for Nonferrous Hot Die Pressings. F. S. Hyde. *Materials & Methods,* v. 31, Feb. 1950, p. 65-67.

Compares relative merits of die pressings, castings, screw-machine parts, and built-up assemblies. (G1, EG-a)

66-G. Steel Warehouse Flame Shape Cutting. W. O. Springer. *Welding Journal,* v. 29, Feb. 1950, p. 97-101; discussion, p. 101-102.

Electronic-tracer flame shape cutting and its operation and applications. (G22)

67-G. Flame Cutting. James T. Lewis, Jr. *Welding Journal,* v. 29, Feb. 1950, p. 116-120.

Installation and maintenance of flame-cutting installations and procedures which contribute to economical operation. (G22)

68-G. Surface Finish Obtained by Grinding. E. N. Maslov. *Industrial Diamond Review,* new ser., v. 10, Jan. 1950, p. 9-10. Translated from *Stanki i Instrument* (Machine Tools and Equipment), v. 19, Jan. 1948, p. 23-24.

Presents results of tests made to determine the influence of grinding conditions and peripheral speeds on surface finish of "9x" Cr steel. (G18, AY)

69-G. Theory of the Metal-Cutting Process. (In Russian.) A. M. Rozenberg and A. N. Eremin. *Stanki i Instrument* (Machine Tools and Equipment), v. 20, Oct. 1949, p. 5-7.

Relations between phenomena occurring during cutting process. It was found that the basis of all changes in cutting phenomena is the change of temperature at the front face of the cutting edge. (G17)

70-G. Investigation of Maintenance of Tolerances of Smoothness and of Cold Hardening During Drilling, Countersinking, and Reaming of Holes. (In Russian.) M. O. Yakobson. *Stanki i Instrument* (Machine Tools and Equipment), v. 20, Oct. 1949, p. 11-13.

Problems involved in obtaining high accuracy of dimensions and correct geometric shape of machine parts, together with obtaining surfaces of minimum roughness were investigated for steel and cast iron. (G17, ST, CI)

71-G. (Book) Production Processes; Their Influence on Design, Vol. I. Roger W. Bolz. 568 pages. Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio. $10.00.

Based on a lengthy series of articles appearing in *Machine Design* since 1945. Prepared to assist designers in analyzing the influences of various shop procedures on design. Methods for removing metal, for forming metal, for working and forging metal, and for depositing metal. Includes 652 illustrations and an index. (G general, F general)

72-G. Marform: A New Press Drawing Tool. Thomas E. Lloyd. *Iron Age,* v. 165, Feb. 23, 1950, p. 78-81.

Using the best features of rubber-press forming and steel die drawing, new process permits deeper draws, lower tool costs, and economical production on both large and small runs. It eliminates finish forming and handles various materials and thicknesses without tool changes. By forming prepainted or finished stock it cuts finishing costs. (G1)

73-G. New Forming Process Demonstrated. John C. McComb. *Steel Processing,* v. 36, Feb. 1950, p. 80-83.

"Marform" process which produces deep draws in aluminum and steel, and is based on the use of rubber as a substitute for the usual female die, with a movable male die made of steel, Kirksite, or masonite. (G1)

74-G. Hot Machining. Guy Hubbard. *Steel,* v. 126, Feb. 27, 1950, p. 60-62.

Destined to speed up production of hard, tough parts, novel system foreshadows distinct types of "heating-cutting" machine tools. (G17)

75-G. Deeper Draws at Less Cost. *Steel,* v. 126, Feb. 27, 1950, p. 66-68, 70.

Reduced tooling costs in low and high volume production, greater tapers without wrinkles, and elimination of hand finish-forming are some advantages cited for Marform process. Success of method is the result of precision control of pressure curve during the forming cycle. (G1)

76-G. Reconstruction of French Sheet Mill; Details of New Equipment. *Sheet Metal Industries,* v. 27, Feb. 1950, p. 109-110, 116.

New steel rolling and annealing equipment. (F23, J23, ST)

77-G. Factors Affecting the Occurrence of "Ears" in the Deep Drawing of Aluminium and Its Alloys. R. Chevigny. *Sheet Metal Industries,* v. 27, Feb. 1950, p. 133-140, 148.

Previously abstracted from *Revue de l'Aluminium.* See item 19D-35, 1949. (G4, Al)

78-G. Chemico-Mechanical Grinding of Hard Metal Tips. *Metallurgia,* v. 41, Jan. 1950, p. 133-134. From article by R. M. Kolker, *Stanki i Instrument* (Machine Tools and Equipment), 1949, p. 17-19.

Combined chemical and mechanical method. Importance of surface grinding metal tool tips before brazing. (G18)

79-G. Chevrolet's Torque Converter: How It Is Made of Precision Cold Formed Steel Parts. Joseph Geschelin. *Automotive Industries,* v. 102, Mar. 1, 1950, p. 38-42, 56.

Miscellaneous fabrication procedures including forming, welding, brazing, annealing, etc. (G1, A5, T21, ST)

80-G. New Metal Forming Process. H. H. Roberts. *Automotive Industries,* v. 102, Mar. 1, 1950, p. 43, 55.

Marform process for sheet metal parts developed by Glenn L. Martin Co. It employs a simple punch for the male portion of the die and rubber under controlled pressure for the female portion. (G1)

81-G. Notes on Machining Stainless Steel. R. H. King. *Aircraft Engineering,* v. 22, Feb. 1950, p. 55-56.

Some practical problems. (G17, SS)

82-G. Are Shop Men Scared of High-Speed Machining? E. J. Tangerman. *American Machinist,* v. 94, Mar. 6, 1950, p. 85-89.

Indicates that the industry as a whole is not taking full advantage of the known machinability of ferrous materials with carbide tools, nor even using high speed steel as well as it can be used. Tells what a few shops are doing to slash costs by improving finish and tool life and reducing power consumption and time requirements. (G17)

83-G. Novel Repair Saves High Replacement Cost. *Iron Age,* v. 165, Mar. 9, 1950, p. 70-72.

How Kaiser repaired broken mill spindle by burning off the fractured end and machining it to fit a new jaw, then shrinking the cast-steel jaw onto the original forging. (G17, K13, CN)

84-G. Aluminum Boats. Charles Bruno and G. W. Birdsall. *Industry & Welding,* v. 23, Mar. 1950, p. 37-38.

Production by stamping and welding. (G3, K general, Al)

85-G. Nimonic Alloys; A Detailed Survey of Modern Machining Practice. *Automobile Engineer,* v. 40, Feb. 1950, p. 57-58.

General considerations, milling, milling cutters, broaching, turning, grinding, boring, and drilling of British Al alloys. (G17, Al)

86-G. Impact Extrusion. *Machinery* (London), v. 76, Feb. 9, 1950, p. 192-196.

As applied to production of hollow Al and Zn parts. Selection of steels for punches and dies, lubrication, and mechanism of the process. Micrographs show structures produced. Effects on hardness. (G5, Q29, Al, Zn)

87-G. Longitudinal Anodic-Mechanical Saw. (In Russian.) Kh. M. Sarbash. *Stanki i Instrument* (Machine Tools and Equipment), v. 20, Nov. 1949, p. 15-16.

Convenient portable apparatus incorporating a type of saw in which a surface-active electrolyte is supplied to the cutting-tool point, thus permitting cutting of surface-hardened material without preliminary heat treatment. (G17)

88-G. Surface Finishing Stainless Steel. L. F. Spencer. *Iron Age,* v. 165, Mar. 9, 1950, p. 73-77; Mar. 16, 1950, p. 82-85.

Major considerations and recommendations of equipment and methods as related to physical properties. First part: Grinding. Second part: Polishing and buffing. (G18, L10, SS)

89-G. Electro-Hydraulic Production of Cranks. *Canadian Metals,* v. 13, Feb. 1950, p. 38-39.

New process which has combined several operations into one. Electrical-resistance heating followed by hydraulic bending is the principle of the machine. (G6, CN)

90-G. A Comparison of Machining of Die Cast Vs. Sand Cast Pump Covers. *Die Castings,* v. 8, Mar. 1950, p. 47-48.

Reduction from five to one-station machining achieved by change to die castings. (G17, E13)

91-G. Transfer Machine—Pros Outweigh Cons. *SAE Journal,* v. 58, Mar. 1950, p. 48-50. Based on papers by D. C. Burnham, O. R. Goodrich, and A. W. Zimmer.

Experiences of Reo, Oldsmobile, and Packard show why transfer machines are gaining popularity. How to use them and possible savings. (G17)

92-G. New Concepts of Abrasive Properties as Affecting Grinding Performance. H. W. Wagner. *Mechanical Engineering,* v. 72, Mar. 1950, p. 225-226.

(G18)

93-G. Chevrolet Adopts a New Torque Transmission. Thomas E. Lloyd. *Iron Age,* v. 165, Mar. 16, 1950, p. 71-75.

Design and fabrication procedures, which represents a radical departure from production techniques heretofore used in converter manufacture. It is made from sheet-metal stampings by use of many dies and assembly fixtures. Miscellaneous drawing, blanking, piercing, and forming operations, also annealing procedures. (To be concluded.)
(G1, J23, T21, ST)

94-G. How To Boost the Output of Multiple-Slide Presses. Part I. Tooling Details. Part II. Auxiliary Equipment. Part III. Control and Operating Procedure. Otto C. Held. *American Machinist,* v. 94, Feb. 6, 1950, p. 73-77; Feb. 20, 1950, p. 124-129; Mar. 20, 1950, p. 100-104.

Explains what must be done to adapt tooling to high-speed operation. (G1)

95-G. "Zipper" Die Closes and Crimps Tube Seam. H. A. Waldon. *American Machinist,* v. 94, Mar. 20, 1950, p. 121.

How intake and exhaust stacks for Deere tractors are formed in two press operations from 0.036-in. thick steel blanks. (G1, ST)

96-G. Estimating Drawing Pressure. Tyler G. Hicks. *American Machinist,* v. 94, Mar. 20, 1950, p. 139.

Nomogram and worked example applicable to shells. (G4)

97-G. Evolution and Analysis of Drawing Lubricants. G. A. Cairns. *Steel Processing,* v. 36, Mar. 1950, p. 135-137, 149. A condensation.

See abstract from *Finish,* item 55-G, 1950. (G21)

98-G. Tungsten Carbide Tooling for Cold Heading. Part III. W. E. Montgomery and W. Leigh. *Steel Processing,* v. 36, Mar. 1950, p. 138-141, 152-153.

Final installment: Design of cut-off quills and cut-off knives. Dimensional specifications. (G10, C)

99-G. Production Bender Boosts Output 250 Pct. *Iron Age,* v. 165, Mar. 23, 1950, p. 69.

The job is to make two 180° bends in 1½-in. diam. brass tubing having wall thickness of 0.032 in. The bending machine is adaptable not only to round tubing and bars, but also to rectangular and square stock and rolled or extruded sections. (G6, Cu)

100-G. Standardization of Hotpoint Range Bodies Paves Way for Mass Production Records. P. D. Aird. *Modern Industrial Press,* v. 12, Mar. 1950, p. 13-14, 16, 20.

Forming and welding operations. (G1, K general, T10)

101-G. Brazing Preforms Can Be Produced by Coining. *Iron Age,* v. 165, Mar. 30, 1950, p. 106.

New technique subjects silver-wire rings of circular cross section to pressures up to 180,000 psi. between smooth polished dies. The washers, used for fusing, bonding, brazing, and soldering, are produced in a variety of shapes and sizes.
(G3, K8, Ag)

102-G. High Production Bolt Manufacture. Wade Palmer. *Western Machinery and Steel World,* v. 41, Mar. 1950, p. 66-69, 91.

Machines produce complete bolts in one automatic sequence of operations, from coils of wire to containerful of finished bolts. Sequence of operations consists of shearing, body extrusion, button heading, thread extrusion, pointing, and roll threading. (G general, T7, CN)

103-G. Cold Heading Costs Cut by Combination Tooling. *Production Engineering & Management,* v. 25, Apr. 1950, p. 54.

Use of tungsten carbide for heading and stamping of trademarks, and other emblems on bolts, rivets, etc., in one operation. (G10, T7, C)

104-G. Tooling for Hot-Machining of Hard-to-Cut Metals. Henry James.

Machinery (American), v. 56, Apr. 1950, p. 152-157.

Investigations by Sam Tour & Co., New York, for the U. S. Navy, on factors involved in turning heated metal in a lathe. Tests were conducted on low, medium, and high-carbon steel, and a high-temperature alloy, Allegheny Ludlum S-816 (42.15% Co, 19.74% Ni, 19.50% Cr, 4.30% W, 3.05% Cb, 2.65% Fe, 1.43% Mn, 0.34% C, and 0.23% Si). Heating was by induction or by gas flame. (G17, CN, AY, Co)

105-G. Marforming—Deep Drawing and Forming Without Wrinkles. R. Burt Schulze. *Machinery* (American), v. 56, Apr. 1950, p. 172-177.

Process developed by Glenn L. Martin Co. (G1)

106-G. Rotary Broaching — New Technique for Finishing Stampings. R. E. Coles. *Machinery* (American), v. 56, Apr. 1950, p. 178-183.

Improved surface finish, rapid production, and accuracy are obtained by method which requires inexpensive tooling. (G17)

107-G. Cold Roll Forming of Metals. E. J. Vanderploeg. *Tool Engineer,* v. 24, Apr. 1950, p. C20-C26.

See abstract of "Cold Roll Forming of Sheet and Strip", *American Society of Mechanical Engineers,* Paper No. 49-S-3, 1949; item 19A-136, 1949. (G11)

108-G. Broaching Application for Cost Reduction. O. W. Bonnafe. *Tool Engineer,* **v. 24, Apr. 1950, p. C36-C37.** (G17)

109-G. The Role of Cutting Fluid as a Lubricant. K. E. Bisshopp, Eric F. Lype, and Severin Raynor. *Lubrication Engineering,* v. 6, Apr. 1950, p. 70-73; discussion, p. 73-74.

Analytical investigation showed that in two-dimensional metal cutting a continuous lubricant film does not exist in the sense usually considered in lubrication problems. Oil, CO_2, Cl_2, and water are considered as lubricating media. 13 ref. (G21)

110-G. Second Operations on Stampings Show Ingenious Tool Engineering. E. E. Bangs and C. V. Seagers. *American Machinist,* v. 94, Apr. 3, 1950, p. 117-121.

Tools, dies, and machines that shave, broach, roll ball ways, curl tight edges, and induction-braze multiple connections on assemblies at plant of L. C. Smith & Corona Typewriters. (G17, K8)

111-G. From a Metallurgist's Notebook: Hot Brass Stampings. H. H. Symonds. *Metal Industry,* v. 76, Mar. 17, 1950, p. 207-208, 211.

Siliceous inclusions were found to be responsible for excessive tool wear when machining certain hot brass stampings. Methods of examination used in determining the reason for this difficulty. (G17, M27, Cu)

112-G. Material and Heat Balance During Oxy-Acetylene Cutting of Low-Carbon Steel. (In Russian.) G. L. Petrov. *Avtogennoe Delo* (Welding), Dec. 1949, p. 20-24.

Results of extensive experimental investigation. (G22, CN)

113-G. Preheating Thin Sheets of Structural Steels During Cutting. (In Russian.) G. B. Evseev and T. A. Degtyar. *Avtogennoe Delo* (Welding), Dec. 1949, p. 24-27.

Influences of preheating the cutting oxygen, and also of preheating the steel to be cut, on rate of cooling of the edges. It was found that preheating the oxygen to 380° C. has little influence on rate of cooling; but that the rate decreases significantly when the steel is preheated. (G22, CN)

114-G. Low-Pressure Oxygen Cutting of Stacks of Steel Plates. (In Russian.) S. V. Begun. *Avtogennoe Delo* (Welding), Dec. 1949, p. 28-30.

Technique. Influences of thickness of individual sheets, total thickness of the stack, and gap between sheets on efficiency of cutting. (G22, CN)

115-G. Proceedings of Moscow Conference on Rapid Methods for Working of Metals. (Continued.) (In Russian.) B. G. Lyul'chenko. *Stanki i Instrument* (Machine Tools and Equipment), v. 20, Nov. 1949, p. 9-12; Dec. 1949, p. 1-6.

Concludes summary of conference of Mar. 22-26, 1949. Deals with machining problems. (G17)

116-G. Method of Production of Wear-Resistant Dies. (In Russian.) M. M. Il'in. *Stanki i Instrument* (Machine Tools and Equipment), v. 20, Dec. 1949, p. 6-10.

Problem of excessive wear of embossed stamping dies. Choice of material, chemical and thermal treatment, welding on of hard alloy embossing materials, and other technological and economic factors. (G3, T5, AY)

117-G. Shaping and Milling of Milling Cutters by an Anodic-Mechanical Method. (In Russian.) G. S. Belyaev. *Stanki i Instrument* (Machine Tools and Equipment), v. 20, Dec. 1949, p. 11-12.

Applicability of the method was investigated. Optimum operating conditions for different shapes and purposes. Set-ups are diagrammed. (G17)

118-G. Mechanical Joining of Hard-Alloy Cutting Tips. (In Russian.) I. G. Turchaninov. *Stanki i Instrument* (Machine Tools and Equipment), v. 20, Dec. 1949, p. 18-19.

Method of joining hard alloy cutting tips to the cutting wheels of milling machines. (G17, K13)

119-G. Some Problems Connected With the Pressing of Motor-Car Body Panels. G. A. Knight. *Sheet Metal Industries,* v. 27, Apr. 1950, p. 325-334.

Considered from the point of view of both the mechanical features of presses, and the metallurgical characteristics of the low-carbon steel used. Mechanical properties, grain sizes, stress-strain characteristics, and aging effects. (G1, T21, CN)

120-G. Correct Machining of Copper-Base Alloys Shrinks Both Tool and Production Costs. Malcolm Buell and J. J. McGuinness. *Steel,* v. 126, Apr. 17, 1950, p. 78-81.

Recommendations for tool design and rates. Diagrams show form and angular dimensions of tools for turning, milling, drilling, reaming, carbide-tool boring, tap and die chasers, circular chasers, taps, and tangential chasers. Alloys are classified in several groups. (G17, Cu)

121-G. Aluminum: Protected Better by Porcelain Enamel. *Ceramic Industry,* v. 54, Apr. 1950, p. 47, 164.

Recommended blanking and forming procedures for 61S Al alloy, preliminary to porcelain enameling. First of series of articles. (G2, Al)

122-G. Powder Cutting and Scarfing of Stainless Steels. C. W. Powell. *Welding Journal,* v. 29, Apr. 1950, p. 308-310.

Procedures and equipment, including typical operating data. (G22, SS)

123-G. The Story Behind Cut-Wire Shot. *SAE Journal,* v. 58, Apr. 1950, p. 54-56. Based on "Process Development—the Link Between Engineering and Manufacturing", by R. J. Emmert.

Development, manufacture and use for peening and cleaning. It is claimed to last longer than ordinary shot, to produce less wear of the equipment, to increase fatigue life of parts peened, and to maintain size uniformity better than ordinary shot. Includes cost comparison. (G23, L10, T5, CN)

124-G. Spinning Wrought Ironheads. Edward B. Story. *Machine and Tool Blue Book,* v. 46, Apr. 1950, p. 79-80.

Production of flanged and dished heads, in which temperature, spinning speed, and roller application govern procedure. (G13, CI)

125-G. Drawing and Annealing Copper Shells. Royden Pratt and J. J. McGuinness. *American Machinist,* v. 94, Apr. 17, 1950, p. 115, 117. (G4, J23, Cu)

126-G. The Organisation and Work of the B.S.A. Group Machinability Research Laboratory. K. J. B. Wolfe and Peter Spear. *Engineer,* v. 189, Mar. 24, 1950, p. 352-354; Mar. 31, 1950, p. 401-403.

British laboratory engaged in work for a group of companies in development of cutting tools, including design, manufacture, testing, and practical operation; development of tool materials, including manufacture and ultimate uses; improvement of machining properties of existing and new materials; determination of correct machining techniques for existing and new materials; development of cutting fluids; and fundamental research on machining. (G17)

127-G. Manufacture of Fusion-Welded Pressure Vessels by Babcock and Wilcox, Limited. *Engineering,* v. 169, Mar. 31, 1950, p. 344-346; *Engineer,* v. 189, Mar. 31, 1950, p. 385-388; *Welding,* v. 18, Apr. 1950, p. 140-149.

Equipment and procedures for forming plates; welding seams, nozzles and branches by multi-layer and submerged arc methods; radiographic inspection of welds; and testing the finishing vessels. (To be continued.) (T26, G1, K1, S13, ST)

128-G. Drilling of Light Alloys. (In French.) Gaston Laval and René Schweyckart. *Revue de l'Aluminium,* v. 27, Jan. 1950, p. 9-16; Feb. 1950, p. 63-69.

Extensive details of recommended equipment and procedures. (G17, Al, Mg)

129-G. Results of Systematic Investigation of the Sawing of Aluminum and Aluminum Alloys. (In German.) E. Von Burg. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 16, Feb. 1950, p. 33-43.

Effects of various factors on the band-sawing of Al. At a given cutting rate, it was found that there is a certain correlation between required feed pressure and shear strength, tensile strength, and Brinell hardness of the material. Conditions for optimum cutting efficiency. (G17, Al)

130-G. (Book) **Machine Tools for Engineers.** Charles R. Hine. 355 pages. McGraw-Hill Book Co., 330 West 42nd St., New York 18. $3.50.

First of two volumes on manufacturing processes evolved from courses developed at Rensselaer Polytechnic

Institute. Aim is to introduce the student to the fundamentals of machine tools and production processes from the viewpoint of the engineer, rather than from that of the machinist. Chapters cover cutting tools, measurement, the lathe, threads and threading, honemaking, the shaper, the planer, the milling machine, broaching, abrasives and grinding, microfinishes, boring machines, gear making, jig boring, sawing, and turret lathes. (G17)

131-G. (Book) Schnitt-Stanz-und Ziehwerkzeuge. (Blanking, Stamping, and Drawing Equipment.) G. Oehler and F. Kaiser. 272 pages. Springer-Verlag, 20 Reichpietschufer, Berlin 35, Germany. 18 D.M.

Presswork tolerances and types of presses; various parts of press tools and tool sets for different types of workpieces, including compound and follow-on tools; bending and forming tools. (G1)

132-G. Band-Sawing Non-Ferrous Castings. H. J. Chamberland. *American Foundryman,* v. 17, Apr. 1950, p. 102-104.

Application of bandsawing methods in the cleaning of nonferrous castings. (G17, SG-a)

133-G. Powder Parts; Machined and Plated. Paul K. Scott. *Iron Age,* v. 165, Apr. 20, 1950, p. 87-90.

Application of machining and plating to lock production. Unusual machining operations on part made from brass powder. Chrome plating techniques for powdered-brass locks. (G17, L17, H general, Cu, Cr)

134-G. Oxy-Acetylene Processes Speed Steel Fabrication. Charles I. Orr. *Western Metals,* v. 8, Apr. 1950, p. 28-30.

Flame cutting, flame hardening, and local heating for welding, done by oxy-acetylene flame in general preparation of steel stock for fabrication at Consolidated Western Steel Corp. (G22, J2, K general, ST)

135-G. An Efficient Production Line For Ice Cream Cabinets; A Photo Story of Fabricating, Welding, Finishing, Assembly and Handling Operations at Nash-Kelvinator Corp., Detroit. William Mikulas. *Finish,* v. 7, May 1950, p. 19-23.

(A5, K general, L general, T29 CN)

136-G. Straight-Line Production Cuts Costs For Hotpoint in Fabricating Dishwasher Cabinets. Erle F. Ross. *Steel,* v. 126, May 1, 1950, p. 94-96, 98, 101.

Blanking, piercing, forming, welding, and finishing equipment and procedures.

(G1, K3, L general, T10, CN)

137-G. Eliminating the "Tap-Tap" Department. Welman A. Shrader. *Aeronautical Engineering Review,* v. 9, Apr. 1950, p. 50-52.

In most plants there is a facetiously called "tap-tap" department where many man-hours are lost in tapping, pounding, and grinding out wrinkles and deformations. Marform process combines good features of steel-die forming with those of the Guerin rubber-pad process, and prevents wrinkle formation. (G1, Al)

138-G. Charts Simplify Light Metal Calculations. Tyler G. Hicks. *Light Metal Age,* v. 8, Apr. 1950, p. 8-10.

Charts permit rapid calculations for cutting, punching, drawing, and bending. Results are sufficiently accurate for all ordinary design and manufacturing work. (G1, Al, Mg)

139-G. A Comparative Description of the Marform Process. R. Burt Schulze. *Light Metal Age,* v. 8, Apr. 1950, p. 12-14, 32.

The Marform process for forming light metals, which combines the forming ability of a steel die with the economical tooling of the Guerin process. (G1, Al, Mg)

140-G. Manufacture of Fusion-Welded Pressure Vessels by Babcock and Wilcox, Limited. (Concluded.) *Engineering,* v. 169, Apr. 7, 1950, p. 373-375.

See item 127-G, 1950.

(G1, K1, T26, ST)

141-G. Spinning Looks Simple—Takes Know-How. *American Machinist,* v. 94, May 1, 1950, p. 100-101.

Picture story shows how Al or stainless steel cones are spun from flat blanks. (G13, Al, SS)

142-G. Change To New Screw Stock Steel Steps Up Production 33 Per Cent. *Steel,* v. 126, May 8, 1950, p. 89-90.

Increase in stud production as a result of switching to B-1113—Jones & Laughlin's newly developed E-steel. Tool life of equipment is also lengthened 25% on the average. (G17, T7, CN)

143-G. 1 Operation Replaces 5. *Steel,* v. 126, May 8, 1950, p. 90.

Previously, Kralinator Products Ltd., Preston, Ont., used five operations, namely, blanking, first drawing, annealing, pickling, and final drawing, to produce oil-filter shells. With new method, the filter shell is made in a single deep drawing operation from 14-gage hot rolled, pickled and oiled strip. (G4, CN)

144-G. Forming Extrusions and Rolled Sections. J. J. Sloan. *Western Machinery and Steel World,* v. 41, Apr. 1950, p. 70-73, 94-95.

Specialized equipment and pro-

cedures including degreeing, jogging, bending and rolling. Application is to Al alloys.
(G1, G6, G11, Al)

145-G. Here Is a New, Easily Made Tool for Cutting Stainless Welds. *Industry & Welding,* v. 23, May 1950, p. 38.

Tool which combines into one unit an air pistol and welding tongs.
(G22, SS)

146-G. Death of the Old "Iron Horse". *Industry & Welding,* v. 23, May 1950, p. 42-44.

Dismantling of steam locomotives by torch cutting. (G22, CN)

147-G. Simple Method of Reducing Cylinder Sleeve Machining Costs. A. A. Herzberg. *Machinery* (American), v. 56, May 1950, p. 186-188.

How cost of machining cast-iron cylinder sleeves has been reduced substantially, rejections minimized, and quality greatly improved by simply turning and facing the castings prior to boring—a reversal of conventional practice. (G17, CI)

148-G. How To Draw Aluminum for Porcelain Enameling. *Ceramic Industry,* v. 54, May 1950, p. 61-62.

Recommendations for equipment and procedures. (G4, Al)

149-G. Nine Operations on Two Presses Cuts Stamping Costs of Toaster Shells. Wallace F. Ardussi. *Steel,* v. 126, May 15, 1950, p. 78-81.

Material used is 0.032-in., cold rolled steel strip. (G3, T10, CN)

150-G. The Oxy-Kinetic Flame Cutting Process. A. E. Leduc. *Engineers' Digest,* v. 11, Apr. 1950, p. 124-125. Translated and condensed from *L'Ossature Metallique,* v. 15, Jan. 1950, p. 37-41.

Equipment and procedure for flame cutting stainless steel. The jet of oxygen is charged with solid particles, thus strongly increasing its kinetic energy, and the slag is expelled by purely mechanical action. Favorable test results have been obtained with 18-8 stainless steels and special steels of still higher alloy content, as well as with cast iron. (G22, SS)

151-G. Thread Rolling—Principles and Practice. *Machine and Tool Blue Book,* v. 46, May 1950, p. 137-138, 140, 142, 146.

Special illustrated report on thread rolling, which is really a cold forging process, since the rolling forms a screw thread by displacement of metal, as opposed to removal or cutting of metal. During rolling, plastic deformation of the material takes place. This distortion has an important bearing on strength of the threaded part. (G12)

152-G. Marform Process. *Mechanical Engineering,* v. 72, May 1950, p. 415-416.

Combination of steel-die and Guerin rubber-forming process, developed by Glenn L. Martin Co., enables existing hydraulic presses to produce a variety of sheet-metal forms and deep-drawn parts with such precision that subsequent hand finishing is unnecessary.
(G1, Al, ST)

153-G. Metal Transfer in the Cutting Process. Milton C. Shaw and Charles D. Strang, Jr. *Journal of Applied Physics,* v. 21, Apr. 1950, p. 349-350.

A fundamental study using a radioactvie specimen of SAE 4027 steel. The metal was machined under CCl_4. The tool was examined radiographically, showing that, even under the most ideal conditions of cutting fluid action, some welding occurs between the chip and tool face with attendant transfer of metal, and further that presence or absence of a built-up edge is merely a matter of degree. (G17, AY)

154-G. A Study of Cutting Face Finishes and Treatments on Twist Drill Performance. Charles E. Bierwirth. *American Society of Mechanical Engineers,* Paper No. 49-A-120, Dec. 1949, 11 pages.

Describes drills of two different types of steel and the eight surface finishes and treatments tested by drilling cast iron and steel forgings. Test procedure and performance results. 19 ref. (G17, TS)

155-G. Oxygen Cutting Processes in Steel Foundries. R. S. Babcock. *American Foundrymen's Society,* Preprint No. 50-39, 1950, 12 pages.

Latest developments in apparatus and operating techniques for removing risers, gates, excess material, heads, defects, and burned sand from stainless and carbon steels. Powder cutting for overcoming oxidation resistance of stainless steels.
(G22, E24, CN, SS)

156-G. New Criteria for Predicting the Press Performance of Deep Drawing Sheets. W. T. Lankford, S. C. Snyder, and J. A. Bauscher. *Transactions of American Society for Metals,* v. 42, 1950, p. 1197-1225; discussion, p. 1225-1232.

Previously abstracted from Preprint. See item 19B-207, 1949.
(G4, Q23, ST)

157-G. Deep Drawing Copper Alloys; The Fundamental Principles of Die

Design. G. Sachs. *Metal Industry,* v. 76, Apr. 14, 1950, p. 291-293; Apr. 21, 1950, p. 310-313. Translated from *Pro-Metal.*

Deals mainly with mechanical rather than with metallurgical aspects. Equations for calculating blank diameters corresponding to 28 cup shapes. (G4, Cu)

158-G. Rapid Cutting of "30KhGSA" Steel. (In Russian.) M. A. Makhatadze. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Feb. 1950, p. 14-15.

Investigation revealed that the above alloy steel (composition not given) is amenable to high-speed cutting (470 meters per min. or more). Influence of cutting speed, of rake angle, and of depth of cut; optimum cutting conditions. (G17, AY)

159-G. Sharpness of Cutting Tool Edges and Quality of the Surface. (In Russian.) P. E. D'yachenko. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Feb. 1950, p. 19-20.

Influence of sharpness (radius of curvature) of the cutting edge on character of the finished surface—roughness, degree of stress hardening, and depth of such hardening. Influence of crystal structure of the steel being cut (sorbite, pearlite, etc.) on the machined surface. (G17, ST)

160-G. Ford Makes Insignias From Precision Dies. H. B. Ihnken. *Iron Age,* v. 165, May 11, 1950, p. 72-74.

Insignias are pantograph-engraved onto punch blanks from master patterns 16 times actual size. Hand tooling achieves corner sharpness after engraving. Brass die blanks receive impressions by pressure mating with the hardened steel punch. (G2, Cu)

161-G. Recommended Sawing Practice for Copper Base Alloys. *Iron Age,* v. 165, May 11, 1950, p. 76.

Recommended speeds of hacksawing and bandsawing for 32 copper alloys, also machinability ratings, are tabulated. Other factors are discussed. (G17, Cu)

162-G. Hot Spot Machining. Part I. Sam Tour. *Tool Engineer,* v. 24, May 1950, p. 17-20.

Hot-spot machining differs from hot machining in that the whole piece is not heated. Only a spot ahead of the tool is heated and this spot is machined away as fast as it is heated. Non-mathematical explanation of fundamental principles of machining. It was reasoned that heating in the absence of coolant should make possible more rapid removal of metal. Results obtained for carbon steel and a series of alloy steels, using special equipment. (To be continued.) (G17, ST)

163-G. Forming Sheetmetal by the Marform Process. R. B. Schulze. *Tool Engineer,* v. 24, May 1950, p. 41-43.

Combination of steel-die drawing and Guerin rubber-pad process. Advantages. (G1)

164-G. How Steel Wool Is Made. Wm. M. Stocker, Jr. *American Machinist,* v. 94, May 15, 1950, p. 102-104.

Equipment and procedures. The wool is made from acid bessemer steel wire by cutting tools which produce threads having irregular cross section and sharp edges. (G17, CN)

165-G. Rules for Metal Spinning. *American Machinist,* v. 94, May 15, 1950, p. 133, 135.

In condensed form, clarified by diagrams, and with table of thickness and depth limitations for various ferrous and nonferrous metals and alloys. (G13)

166-G. Superior Machining at Lower Cost With MX. George R. Caskey. *Iron Age,* v. 165, May 18, 1950, p. 95-98.

Additional test data on new free-machining steel developed by Carnegie-Illinois. Claims saving of 16-22% on production runs. Comparative properties of MX vs. B-1113 show that the new steel has better elongation and reduction of area but lower strength. It steps up output and tool life, decreases downtime, improves finish and works to closer tolerances. (G17, Q23, CN, SG-k)

167-G. New Developments in Oxyacetylene Cutting Machines. W. Begerow and A. H. Yoch. *Welding Journal,* v. 29, May 1950, p. 382-387.

Special purpose and standard machines and their uses. (G22)

168-G. Cold Extrusion of Steel; A New Horizon in Metalworking. J. Parker Bowden. *Steel Processing,* v. 36, May 1950, p. 227-233. (A condensation.)

Development of cold extrusion process by Heintz Mfg. Co., Philadelphia, on the basis of information and equipment received from Germany. The lubricant system and basic types of extrusion. Data for ultimate strengths of extruded ingot iron and various carbon and alloy steels. Experimental production of specific items. (G5, Fe, ST)

169-G. Meet the Bug Wire Weavers. Thorp McClusky. *Steelways,* v. 6, May 1950, p. 29-32.

Equipment and procedures for

weaving of wire cloth and insect screening at seven factories in York County, Pa. (G6)

170-G. Charts Simplify Calculations. Part 2. Punching Power and Drawing Forces. Tyler G. Hicks. *Machine Design,* v. 22, May 1950, p. 129-130.

Includes worked examples. (G1)

171-G. Use the Right Machining and Drawing Fluids To Improve Production Efficiency. E. L. H. Bastian. *Steel,* v. 126, May 29, 1950, p. 58-62, 80, 83.

The various types, their advantages and disadvantages, properties, and applicabilities. (G21)

172-G. Let's Talk About Carbides. *Industrial Diamond Review,* new ser., v. 10, Apr. 1950, p. 107-110. Extracted from *Blue Chips* (Warner & Swasey Co.), v. 4, 1948, p. 41-43, 46, 49-51, 62-63.

Effects of various factors on carbide cutting-tool performance. Tests were made on hot rolled SAE 1020 steel. Effect of tool shape on tool life, cause and effects of cracks in tool tips, effect of change in work diameter, effects of heat on tool life, effects of chip impact, and effects of differences in the steel. (G17, T6, CN, C)

173-G. Comparison Charts for Sintered Carbide Grades. *Industrial Diamond Review,* new ser., v. 10, Apr. 1950, p. 111-113.

Charts for commercial types produced in the U.S. and England. (G17, T6, C)

174-G. Automotive Sheet Metal Screws. Albert Wright. *Western Machinery and Steel World,* v. 41, May 1950, p. 80-81.

Production by California Fasteners Co. for Ford, Lincoln, and Mercury. Coldheading, wiredrawing, and thread rolling equipment (G10, G12, F28, T7)

175-G. Rolled Formed Sections. Howard A. Burleson. *Western Machinery and Steel World,* v. 41, May 1950, p. 82-83.

Production for Ford cars by Western Mouldings & Stampings, Inc., Ontario, Calif. (G11, T21, ST)

176-G. Press Work at General. Elmer L. Lipp. *Western Machinery and Steel World,* v. 41, May 1950, p. 96-97.

Mass production of stamped automotive parts for Ford Motor Co. by General Machine Works in California. (G1, T21)

177-G. Fasteners Require Quality Too. Samuel M. Washabaugh. *Western Machinery and Steel World,* v. 41, May 1950, p. 102-103.

Manufacture of miscellaneous fasteners by National Screw & Mfg. of Calif. (G17, G10, T7)

178-G. A Machinability Test for Treated Cast Iron. E. A. Loria and R. L. Keller. *Iron Age,* v. 165, June 1, 1950, p. 73-76.

Shows that thin-section gray-iron castings are susceptible to surface hardening effects that lower machinability. Use of silicon carbide cupola addition agents lessens chilling tendency and improves machinability. Tests show increases in tool life of 50-100%. (G17, E10, CI)

179-G. Character and Performance of MX Bessemer Steels. George R. Caskey. *Screw Machine Engineering,* v. 11, June 1950, p. 30-39.

Previously abstracted from "Superior Machining at Lower Cost with MX." *Iron Age.* See item 166-G, 1950. (G17, Q23, CN, SG-k)

180-G. Hot-Stamping the "Superalloys". William Van Den Akker. *Aero Digest,* v. 60, June 1950, p. 33, 83.

Procedures at Stainless Steel Products Inc., for manufacturing parts for high-temperature service in gas turbines, jet engines, rocket engines, etc. Superalloys contain a large number of alloys with or without the predominance of Fe. (G3, SG-h)

181-G. Cold Roll Forming for Mass Production of Shapes of Uniform Profile. E. J. Vanderploeg. *Metal Industry,* v. 76, May 19, 1950, p. 399-401, 406.

Recommended procedures, with emphasis on roll-pass design. (G11)

182-G. Concerning the Embossing of Metals. (In French and German.) P. Huguenin. *Pro-Metal,* v. 3, Apr. 1950, p. 587-601.

General types, methods, materials, coining, and embossing of various types of sheet metal. Various commercial Cu-base alloys suitable for this work. 11 ref. (G3, Cu)

183-G. Problems in the Standardization of Equipment for Oxygen Cutting. (In Russian.) A. N. Shashkov. *Avtogennoe Delo* (Welding), Feb. 1950, p. 28-31.

(G22)

184-G. Hardened Steel Milled With Carbide. Anderson Ashburn. *American Machinist,* v. 94, June 12, 1950, p. 94-95.

Machining operations on dies hardened to Rockwell C-62. Milling, drilling, boring, and counterboring are all done with carbide tools of special design. (G17, TS)

185-G. Rheem Forms 55-Gal. Drums After Color Lithography. L. A. Reber. *Iron Age,* v. 165, June 15, 1950, p. 99-103.

Rheemcote, or new fabricating technique which produces steel drums with accurately lithographed, multi-colored exteriors, and sanitary, non-corrosive interiors. Internal and external coatings are applied before forming operations which include shot blasting, resistance welding, roll forming into cylindrical shape, flanging and beading for heads and bottoms. (G general, L26, ST)

186-G. Deep-Drawing of Stainless Steel on Transfer Type Presses. Charles H. Wick. *Machinery* (American), v. 56, June 1950, p. 162-165.

Technique for drawing deep, small-diameter cups from thin stainless-steel strip stock on transfer type presses. As many as eight progressive draws are made without intermediate annealing. (G4, SS)

187-G. How Revere Checks Machinability. Harry Schagrin. *Steel,* v. 126, June 19, 1950, p. 84-86.

Rapid, accurate method for determining the machinability of free-cutting brass and other metals. The new quality-control technique measures and interprets minute movements a cutting tool makes under changes of cutting stresses. (G17, S12, Cu, SG-k)

188-G. New Markets Open for Expanded Metal. *Inco,* v. 24, Spring, 1950, p. 16-17, 28; *Steel,* v. 126, June 19, 1950, p. 104, 107.

Mesh and screening produced by simultaneous slitting and expanding of sheet monel, Inconel and other Ni alloys. (G15, T10, Ni)

189-G. Electric Spark Machining. I. Koncz. *Engineers' Digest,* v. 11, Apr. 1950, p. 108-111; May 1950, p. 165-168. Translated and condensed from *Gép* (Hungary), v. 1, Sept.-Oct. 1949, p. 388-411.

Experimental equipment and procedure for machining and grinding hard alloys. In drilling a hole in a metal part, the part is connected to the positive pole of a d.c. source. The electrode periodically contacts the part and causes the condenser to discharge. The discharge takes the form of a spark at the point of contact, which becomes quenched by a liquid covering the part. Each spark discharge removes some of the material. Evaluation of oscillograms, mechanism of spark machining, accuracy of measurements, and industrial possibilities. (G17)

190-G. Powder-Cutting and Scarfing Processes. Rodger S. Babcock. *Blast Furnace and Steel Plant,* v. 38, June 1950, p. 674-680.

Chemistry, apparatus, operation of power equipment, metallurgical aspect, applications of powder process in the foundry, heavy cutting of scrap, and conditioning by powder scarfing. (G22)

191-G. The Design of Cylinders by Autofrettage. W. R. D. Manning. *Engineering,* v. 169, Apr. 28, 1950, p. 479-481; May 5, 1950, p. 509-511; May 19, 1950, p. 562-563.

"Autofrettage" is a means of achieving stress distribution by overstraining the tube by internal pressure, and then annealing it at a low temperature. A proposed method for applying autofrettage to general problems of design, which involves preparation of special charts, has not yet been fully tested, but appears to be accurate enough for most purposes. Applicability to various metals and alloys. (G23)

192-G. (Book) **Pruefen der Zerspanbarkeit durch Messung der Schnittemperatur.** (Testing of Machinability by Measurement of Cutting Temperature.) M. Lang. 119 pages. 1949. Carl Hanser Verlag, Munich 27, Germany. 8.20 DM.

Surveys the most important rapid testing methods for determining cutting temperature. Sources of error in temperature measurement. (G17, S16)

193-G. Contour Machining Reproduces Forgings and Castings. H. J. Chamberland. *Iron Age,* v. 165, June 22, 1950, p. 90-92.

How tooling costs for short-run production can be eliminated by making parts with contour saws. Three-dimensional cutting is being done. Such parts are said to be sometimes stronger than those produced by regular methods. (G17)

194-G. Friction Cutting of Steel. John E. Hyler. *Steel Processing,* v. 36, June 1950, p. 295, 310.

Circular and bandsaw processes; present and potential applications. Special work-tilting technique which makes the bandsaw process applicable to heavier pieces of flat stock than otherwise. (G17, ST)

195-G. Deep and Tapered Stampings Without Wrinkles. R. Burt Schulze. *Metal Progress,* v. 57, June 1950, p. 769-772.

Marform process works well for bending, simple stretching, or a combination of the two. However, wrinkles are likely if the metal must be shrunk—a disadvantage corrected by confining the rubber pads on all sides with fairly high pressure varied correctly during the entire forming stroke. (G1)

196-G. Machining of Stainless Steel. E. Von Hambach. *Metal Progress,* v. 57, June 1950, p. 781-791.

Specific information and recommendations concerning tool angles, speeds, feeds, and coolants for the principal types of stainless steels and the principal machine-shop operations. (G17, SS)

197-G. Stretch-Forming. *Aircraft Production,* v. 12, June 1950, p. 184-189.

New-type machine developed and installed at Fairey Aviation Co. Ltd., in Britain. (G9)

198-G. Newer and Higher Press Precision Standards Set in Manufacture of Chevrolet Automatic Transmission. P. D. Aird. *Modern Industrial Press,* v. 12, June 1950, p. 13-14, 16, 42, 44.

Press operations, annealing, and welding.
(G1, J23, K general, T21, ST)

199-G. KoolVent Aluminum Awnings Are Custom-Made in Small, Efficient Plants. Walter Rudolph. *Modern Industrial Press,* v. 12, June 1950, p. 34, 36, 38.

Forming, shearing punching, trimming, and finishing operations.
(G1, Al)

200-G. Milling Machine Power Requirements. A. O. Schmidt. *Western Machinery and Steel World,* v. 41, June 1950, p. 65-67.

Experiments on factors influencing power consumption and cutter wear demonstrated in milling of steel and other common metals and alloys using tungsten-titanium carbide cutters. (G17)

201-G. Cutting Tips. D. S. Jones. *Western Machinery and Steel World,* v. 41, June 1950, p. 68-69, 87.

Practical hints for flame cutting and maintenance of equipment. (G22)

202-G. Shade Screen From Sheet. *Western Machinery and Steel World,* v. 41, June 1950, p. 76-77.

Complex cutting and forming machine designed by Kaiser Aluminum and Chemical Corp. for manufacture of a new type of window screen by perforating and forming Al sheet. (G15, T10, Al)

203-G. Nail Production. Geoffrey K. Rylands. *Wire and Wire Products,* v. 25, June 1950, p. 487-491, 524-530.

Equipment and procedures of Rylands Brothers, Ltd., England. Besides production of nails from wire using special machines, considerable emphasis is placed on barrel polishing and galvanizing operations.
(G10, L10, L16, T7, CN)

204-G. The Business of Cold Heading. Kenneth J. Sorace. *Wire and Wire Products,* v. 25, June 1950, p. 500-501, 517-518.

Some experiences in production of miscellaneous steel screws and bolts by Lamson & Sessions Co., Cleveland. (G10, ST)

205-G. Tests Prove Worth of Cold Extruded Bolts. A. S. Jameson, J. A. Halgren, and S. A. Sheridan. *Iron Age,* v. 165, June 22, 1950, p. 81-84; June 29, 1950, p. 72-75.

Cold headed, double-extruded, hexagon-head steel bolts are more economical to manufacture than the quenched and tempered variety. Method of manufacture, mechanics of cold working, and effect of reheating on the microstructure and physical properties. Part 2: Mechanical-test results.
(G5, G10, Q general, T7, CN)

206-G. The Drawing of Stainless Steels. R. H. Henke. *Tool & Die Journal,* v. 16, June 1950, p. 48-49, 62, 70; July 1950, p. 40-42, 44.

Factors affecting drawing. Composition and its effect on annealed tensile properties. Compares plastic deformation with that of nonferrous materials. (G4, Q24, SS)

207-G. Charts Simplify Cost Calculations. Part 4. Milling Feed and Time. Tyler G. Hicks. *Machine Design,* v. 22, July 1950, p. 151-152.

Milling-machine feed and the subsequent milling time required for a specific operation. Curves cover six common metals and alloys. (G17)

208-G. Carbides Speed Machining of Chilled Iron Rolls. Joseph Frisch. *Iron Age,* v. 166, July 6, 1950, p. 94-96.

Advantages on the basis of Allis-Chalmers experiences.
(G17, T5, C, CI)

209-G. British Cutting Torch Said To Save Gases. *Welding Engineer,* v. 35, July 1950, p. 30-31.

Torch built on an entirely new principle of design has been used with satisfactory results in a British steel foundry for well over a year to cut off headers and risers. Large savings in gas consumption (12-40%) are claimed. (G22, CI)

210-G. Precision Manufacture of Aluminum. Gilbert C. Close. *Light Metal Age,* v. 8, June 1950, p. 10-11, 20-21.

Casting, machining, seamless-tube extrusion, brazing, finishing, etc., as applied to manufacture of Al aircraft accessories at AiResearch Mfg. Co., Los Angeles. Machined tolerances within 0.0001-in., dynamic-balance tolerances equivalent to 5-millionths of an inch, and over all precision tolerances 30 times finer than

used in the best watches, are routine production-line requirements. (G17, T24, Al)

211-G. New Process for Manufacturing Aluminum Foil Tubes. *Light Metal Age,* v. 8, June 1950, p. 12-13.

New equipment and process produces tubes from foil, laminated or coated on both sides with plastic. Precoated, preprinted foil is formed into cylinders and heat sealed. Then the neck and threads are formed. (G general, T10, Al)

212-G. Stampability Test for Medium and Heavy Sheets. (In French.) Eug. Herzog. *Revue de Métallurgie,* v. 47, May 1950, p. 399-408.

A modification of G. Sachs' test for determination of stampability. Deformation taking place during the test is thoroughly analyzed. Operating technique. Application of the test to steel sheets. (G3, Q23)

213-G. Oxy-Kinetic Cutting. (In French.) A. E. Leduc. *Revue de la Soudure; Lastijdschrift,* v. 6, no. 1, 1950, p. 31-41.

See abstract of condensed English version in *Engineers' Digest,* item 150-G, 1950. (G22, ST)

214-G. Determination of Optimum Lead Angle of Hard-Alloy Cutting Tools During Rapid Cutting. (In Russian.) M. N. Larin. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Feb. 1950, p. 41-49.

Simplified relationship, based on experimental data. Influences of yield strength, bend resistance, rate of cutting, and thickness of cut. Optimum cutting conditions are tabulated for 37 special steels. (G17, ST)

215-G. Cold Stamping of Complex Dies for Punch Presses on Hydraulic Presses. (In Russian.) A. I. Kogan. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Feb. 1950, p. 49-54.

Practical development of a method of forming punch-press dies by cold stamping. Such a method, using hydraulic presses, guarantees a shape accuracy within 0.03 mm. and a surface finish accurate to 1 μ. Three basic types of such stampings were studied in detail. Optimum conditions were determined for different materials and die dimensions. (G3, T5, ST)

216-G. Investigation of Operation of Lathes Using Cutting Tools With Diamond Tips. (In Russian.) A. G. Nalchan. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Mar. 1950, p. 6-9.

Factors causing vibration of lathes and influence of the latter on the uniformity and precision of the finished surface during machining of an Al-Mg alloy piston. Means of reducing harmful vibration. (G17, Al)

217-G. Surface Quality During Planing of Metals. (In Russian.) P. E. D'yachenko and A. P. Dobychina. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Mar. 1950, p. 12-14.

Influence of various factors, such as sharpness of the cutting edge, thickness of metal, rate of planing, cutting speed and structure of base metal (sorbite, grainy pearlite, plastic pearlite, and as-received normalized steel structures) on surface quality. (G17, ST)

218-G. Oxygen and Arc Cutting of Scrap Metal (Intended for the Openhearth Furnace.) (In Russian.) S. V. Begun. *Avtogennoe Delo (Welding),* v. 21, Mar. 1950, p. 23-24.

Optimum methods of cutting up different types of scrap metal for the openhearth charge were studied, comparing oxygen and electric-arc cutting. (G22, ST)

219-G. Determining the Machinability of Metals. Gerald Lewis. *Machinery* (American), v. 56, July 1950, p. 152-154.

Machinability tester suited for use by workers of average skill. This instrument, known as the MSE-Schlesinger machinability tester, rapidly measures the two basic characteristics of machinability. These are specific cutting resistance and abrasive effect. (G17)

220-G. Production, A Series of Compromises. Louis J. Lovisek. *Wire and Wire Products,* v. 25, July 1950, p. 563-567.

Compromises in the making of screws by cold heading and thread rolling, necessitated because of cost factors. Compromises also extend to quality standards on the rods used as raw material. Considers only ferrous materials. (G10, G12, S22, Fe)

221-G. What Carbide Insert Tools Can Do for You. *Steel,* v. 127, July 17, 1950, p. 80-81, 96.

How carbide inserts can reduce machining costs by speeding production, and by cutting down time needed for changing setup, regrinding, and resharpening. (G17, T6, C)

222-G. Coin-Dimpling; Counter-Pressure Process for the Accurate Control of Rivet-Head Form. Part I. Basic Principle and Governing Factors. *Aircraft Production,* v. 12, June 1950, p. 181-183.

Method of pre-forming the harder light alloys for flush-riveting without causing cracks, originally developed for use on 24S-T sheet in the shops of North American Aviation, Inglewood, Calif. (To be continued.) (G2, Al)

223-G. Free-Cutting Steel Machinability Measured by New 'Yardstick'. *Screw Machine Engineering,* v. 11, July 1950, p. 36-38.

New method based on the use of a Monarch lathe equipped to provide fixed tool pressures with a constant component in horizontal direction. Developed by Monarch Machine Tool Co., in cooperation with Battelle Memorial Institute under the sponsorship of Carnegie-Illinois Steel Corp. (G17)

224-G. "Oxyarc" Oxygen-Electric Arc Cutting. (In German.) H. Schmidt-Bach. *Schweissen und Schneiden,* v. 2, May 1950, p. 93-96.

New process, its use in the cutting of different metals, for removal of rivets, and for hole cutting. (G22)

225-G. Knit Wire Finds New Applications. E. F. Ross. *Steel,* v. 127, July 24, 1950, p. 65-66, 79.

Equipment and procedures of Letraw Mfg. Co., Chicago which knits about 30,000 lb. of 0.005-0.011-in. steel and copper wire each week on 55 special machines. Varied uses, the most familiar of which are the pot cleaners used by the housewife. (G general, T10, Cu, ST)

226-G. Collapsible Tubes in Aluminium Plastic Laminate. *Light Metals,* v. 13, July 1950, p. 380-385.

Equipment and procedures for production of above by ATF Incorporated, Elizabeth, N. J. Al foil coated on both sides with plastics, is impact extruded into tubes. (G5, Al)

227-G. Coin-Dimpling; Counter-Pressure Process for the Accurate Control of Rivet-Head Form. Part II. Machines and Equipment. *Aircraft Production,* v. 12, July 1950, p. 221-226.

Notes on procedure based mainly on the practice of Canadair, Ltd. (G2, K13, T24)

228-G. "Super Machining" Steels Increase Production 100%. E. F. Ross. *Steel,* v. 127, July 31, 1950, p. 60-62, 84, 86, 88-89.

Automatic screw-machine shops report excellent performance for the improved free-machining Bessemer and lead-bearing rephosphorized and resulfurized openhearth steels. Much longer tool life, reduced down time, higher cutting speeds and feeds, increased operating efficiencies are some of the advantages claimed. (G17, CN)

229-G. Steel Does the Dirty Work. Eleanor Harvill. *Steelways,* v. 6, July 1950, p. 24-25.

An elementary description of the manufacture and uses of steel wool. Steel wire travels past stationary steel knives which gouge out triangular threads of "wool". Average analysis of the wire is 0.12% C, 0.90% Mn, 0.10% P, and 0.04% S. (G15, CN)

230-G. Tool and Temper Know-How Solves Forming Problems on Copper Alloys. P. B. Tursi. *Materials & Methods,* v. 32, July 1950, p. 58-59.

Shows by two examples that incorrect forming tool specifications are often to blame for cracks and rejects, rather than poor material. (G general, Cu)

231-G. How To Fabricate Molybdenum. Jack Chelius. *Materials & Methods,* v. 32, July 1950, p. 45-48.

Recommended procedures for forming, including punching, shearing, drawing, and spinning; stress-relief annealing; machining; joining (brazing and welding); and surface finishing. (G general J1, K general, L general, Mo)

232-G. Paint Containers. *Paint Manufacture,* v. 20, July 1950, p. 243-248.

Development of the metal container industry, the technique of container manufacture and some of the legal and technical considerations involved. Rolling, blanking, welding, and finishing equipment and procedures. (G general, K general, L general, CN, Sn)

233-G. Successful Variation in Metal Fabrication. Howard E. Jackson. *Modern Industrial Press,* v. 12, July 1950, p. 13-14, 16, 18, 38.

Miscellaneous equipment and procedures of Flohr & Co., Seattle, in production of heavy equipment. Forming, welding, stamping, hole punching, shearing, etc. (G general, CN)

234-G. Fabrication of Kitchen Utensils at Foley Mfg. Co. Gerald E. Stedman. *Modern Industrial Press,* v. 12, July 1950, p. 20, 22, 24.

Procedures and equipment. Miscellaneous press operations, passivation, and hot-dip tinning. (G1, L16, T10, CN)

235-G. Creating Modern Silverware. Parts I and II. Frank C. Mesle. *Plating,* v. 37, July 1950, p. 736-740; Aug. 1950, p. 845-849.

Picture story of equipment and procedures of Oneida Ltd., Oneida, N. Y. Blanking, shearing, embossing, forming, brazing, polishing, and grinding operations. Nickel silver

(18% Ni, 18% Zn, 64% Cu) is the base metal used. Part II: Polishing, buffing, and plating operations. How research, development, and testing activities play an important role in the production of quality silverware.
(G general, L general, T10, Cu)

236-G. Accuracy in Machining—Its Standardisation and Cost. T. H. Vogel. *Engineers' Digest,* v. 11, July 1950, p. 245-250.

Need for more systematic and realistic establishment of tolerances. Details of a short investigation of the rise of manufacturing cost with increasing accuracy using the ISA System, which is explained. (G17)

237-G. Electronic Robot Boosts Lathe Output 700 Pct. *Iron Age,* v. 166, Aug. 3, 1950, p. 73-74.

Control unit which opens way for unskilled operators to increase machine-tool output tremendously. Designed for manually operated machines on job orders or short runs, it permits exact repetition to close tolerances. Setup of control is relatively easy and fast. Holes punched in a roll of paper control the sequence of operations. (G17)

238-G. Fundamentals of Cutting Fluid Action. M. Eugene Merchant. *Lubrication Engineering,* v. 6, Aug. 1950, p. 163-167, 181.

Basic functions; cooling; friction reduction; cutting ratio; benefits of friction reduction; mechanism of friction reduction; and cooling vs. friction reduction. Table gives observed reduction in friction between chip and cutting tool by applying cutting fluid, compared with calculated maximum reduction predicted from shear strength of solid film for iron, copper, aluminum, and lead. (G21)

239-G. Hole Drilled Half Diameter of Human Hair. *Steel,* v. 127, Aug. 7, 1950, p. 88.

Special technique and apparatus used to produce hole 0.0006 in. diam. in a piece of platinum. An electrical instrument was necessary to show when the drill made contact with the metal. (G17, Pt)

240-G. Stamped Jet Engine Parts Made by Special Techniques. *SAE Journal,* v. 58, Aug. 1950, p. 28-32. Based on "Precise Methods of Fabricating Sheet Metal Parts" by W. C. Heath.

Various difficult fabrication jobs on Inconel and stainless, including stamping, forming, shearing, piercing, machining, and welding (varied processes.)
(G general, K general, T25, Ni, SS)

241-G. SAE Shot Peening Group Searches for Method To Forecast Shot Life. *SAE Journal,* v. 58, Aug. 1950. p. 76-77.

Round-table discussion of results obtained with the Pangborn, the American Wheelabrator, the Alloy Metal Abrasive, and the Mattson-Cargill shot testers. (G23)

242-G. How to Micro-Finish Carbide Tools. David Kauffman. *Tool Engineer,* v. 25, Aug. 1950, p. 20-22.

243-G. Metal-Stamping Operations and Die Design. Part I. S. E. Rusinoff. *Tool Engineer,* v. 25, Aug. 1950, p. 26-28.

Equipment and procedures. Principles of die design are clarified by diagrams. (G3)

244-G. Unusual Press Set-Ups Used in Producing Washing Machine Parts. A. E. Sweet *Machinery* (American), v. 56, Aug. 1950, p. 144-150.

Forming, shearing, and welding of steel and Al parts by Maytag Co. (G1, ST, Al)

245-G. Die That Eliminates Ten Operations. *Machinery* (American), v. 56, Aug. 1950, p. 182.

Combination blanking and forming die illustrated has enabled the time required for forming Al spray rails for boats to be reduced by more than 80%. The new die permits the entire rail to be formed in one operation, as compared with 11 operations previously required.
(G2, G3, Al)

246-G. How U. S. Radiator Makes Radiant Baseboards. A. H. Allen. *Steel,* v. 127, Aug. 14, 1950, p. 82-84.

The old-fashioned steam radiator has now become an unobtrusive baseboard with an accompanying construction change from cast iron to pressed steel. Equipment and procedures for their fabrication by U. S. Radiator Corp. Press operations, spot and flash welding, and brazing are used.
(G1, K3, K8, ST)

247-G. Scrapping Big Wheel. *Welding Engineer,* v. 35, Aug. 1950, p. 20-21.

Use of powder-cutting method on 16-ft. flywheel. (G22, CI)

248-G. Metal Transfer in the Cutting Process. Milton C. Shaw and Charles D. Strang, Jr. *Tool & Die Journal,* v. 16, Aug. 1950, p. 36-37, 66.

Previously abstracted from *Journal of Applied Physics,* item 153-G, 1950. (G17, AY)

249-G. Sawing of Magnesium. *Edgar Allen News,* v. 29, July 1950, p. 613-616.

Equipment and procedure involv-

ing the use of tungsten carbide tips on the saws. (G17, T6, C)

250-G. Metal Cutting: Art to Science. Hans Ernst. *American Society for Metals,* "Machining—Theory and Practice", 1950, p. 1-4.

A brief history of the development of metal cutting. (G17)

251-G. Metal Cutting Research—Theory and Application. M. Eugene Merchant. *American Society for Metals,* "Machining—Theory and Practice", 1950, p. 5-44.

Metal-cutting fundamentals, test methods, work materials, their mechanical properties and microstructure, and cutting tools and fluids. Concerned with various steels, Al, Cu, and brass. 14 ref. (G17, Q general, M27, ST, Al, Cu)

252-G. Cutting Fluid Theory. Milton C. Shaw. *American Society for Metals,* "Machining—Theory and Practice", 1950, p. 45-68.

Results accomplished by cutting fluids and some of their limitations when used on Fe, Al, Cu, SAE 1020 steel, and 18-8 stainless steel. (G21, ST, Al, Cu, CN, SS)

253-G. Materials and Machinability. Francis W. Boulger. *American Society for Metals,* "Machining—Theory and Practice", 1950, p. 69-109.

Machinability, surface finish, and the influence of materials and their mechanical properties. 33 ref. (G17, Q general)

254-G. Development of the Macrostructure of Metals by Machining. L. M. Clarebrough and G. J. Ogilvie. *American Society for Metals,* "Machining—Theory and Practice", 1950, p. 110-122.

Shows that transverse markings exist on lead crystals after machining and that marking variations are responsible for development of macrostructure. Markings are transverse irregularities formed from a built-up edge and their formation correlates with crystal orientation. (G17, M28, Pb)

255-G. Metallurgy and Machinability of Steels. J. D. Armour. *American Society for Metals,* "Machining—Theory and Practice", 1950, p. 123-168.

Machining tests on carbon, alloy, and stainless steels using automatic screw machines. Includes data sheets of surface cutting speeds for various grades of these steels and of cutting speeds and feeds for standard tools. (G17, AY, CN, SS)

256-G. Tool Steels. George A. Roberts. *American Society for Metals,* "Machining—Theory and Practice", 1950, p. 169-198.

Principal characteristics required for machining other materials, classification of the toolsteels used for machining, and the three main classifications used for machining carbon, medium-alloy, and high speed steels. Composition and properties of each. 10 ref. (G17, Q general, TS)

257-G. Cemented Carbide Tool Materials. John C. Redmond. *American Society for Metals,* "Machining—Theory and Practice", 1950, p. 199-217.

Nature of tungsten carbide compositions and the design and use of tools. (G17, T6, C, W)

258-G. Heat in Metal Cutting. A. O. Schmidt. *American Society for Metals,* "Machining—Theory and Practice", 1950, p. 218-340.

The calorimetric process applied to power determination in drilling; calorimetric power measurements in milling, workpiece surface and subsurface effects of machining; tool wear, chip formation, cutting speed, and milling high-strength alloys at elevated temperatures. Data on production runs with carbide milling cutters. Data for Al, brass, bronze, cast and malleable iron, and a variety of steels. 26 ref. (G17, S16, Al, Cu, CI, ST)

259-G. Evaluation of Machinability of Rolled Steels, Forgings and Cast Irons. Michael Field and Norman Zlatin. *American Society for Metals,* "Machining—Theory and Practice", 1950, p. 341-376.

Determination of machining characteristics of metals and their application toward more economical machining operations. Effect of microstructure, work hardening capacity, coefficient of friction between chip and tool, and shearing strength of the metal being cut. Includes micrographs. (G17, ST)

260-G. Tool Life Testing. Orlan W. Boston. *American Society for Metals,* "Machining—Theory and Practice", 1950, p. 377-408.

Types of tool failure, methods used to evaluate tool life, cutting speed and tool-life relation, wear vs. surface finish, and flank wear on carbide tools. An example of complete failure in high speed steel tools. Data for toolsteel, carbon steel, and monel. (G17, Q9, TS, CN, Ni)

261-G. Some Metallurgical Aspects of Grinding. L. P. Tarasov. *American Society for Metals,* "Machining—Theory and Practice", 1950, p. 409-464.

Reviews things that have been learned about the grinding process in relation to the metal being

ground. Nature of the grinding process, grindability, surface cracking, grinding burn, grinding stress, surface injury, and factors contributing to it. Alloy and tool steel. Includes micrographs. 22 ref. (G18, AY, TS)

262-G. Economics of Machining. W. W. Gilbert. *American Society for Metals,* "Machining—Theory and Practice", 1950, p. 465-485.

Methods for decreasing cutting costs by increasing rate of metal removal. Tool life and corresponding cutting speed can be computed for minimum cost or maximum production rate. Methods for checking power capacity. Costs can also be reduced by reducing tool-changing cost, regrinding cost, and idle, loading, or noncutting cost. 14 ref. (G17)

263-G. Press Shop Methods in Torque Converter Production. Charles H. Wick. *Machinery* (London), v. 77, July 20, 1950, p. 67-74.

The hydraulic torque converter for the automatic transmission used on Chevrolet cars is made from precision stampings, spot welded and copper-brazed to pressed metal housings. Stamping and joining equipment and procedure. (G3, K3, K8, T21, ST)

264-G. Hot Machining for Tough Alloys. Henry Janes. *Machinery* (London), v. 77, July 20, 1950, p. 75-78.

Work of Sam Tour & Co., New York, on "hot machining". Data for carbon and alloy steels and for Allegheny Ludlum's high-temperature alloy S-816 are tabulated. (G17, CN, AY, SG-h).

265-G. "Powder Cutting" of Ferrous and Non-Ferrous Metals. *Engineering,* v. 170, July 21, 1950, p. 57.

British equipment and processes. Table gives operating conditions for powder cutting of stainless steel. (G22)

266-G. Oxygen-Electric Arc Cutting. (In German.) Hans Schmidt-Bacn. *Neue Giesserei,* v. 37 (new ser., v. 3), June 1, 1950, p. 210-211.

The method and its fields of application. (G22)

267-G. Threading Parts of Austenitic Steel. (In Russian.) N. N. Zorev. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Apr. 1950, p. 15-17.

Influence of lead angle of cutting, rake angle, main plane angle (of enclosed cone), rate of cutting, pitch of thread being cut, and use of cooling-lubricating liquids on strength of thread cut by a high-speed cutting disk on a typical austenitic steel was investigated. (G17)

268-G. Influence of Wear of Cutting Tool on Microgeometry of Surfaces. (In Russian.) P. P. Grudov and Kh. V. Levant. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Apr. 1950, p. 17-18.

Experimentally investigated on gray cast iron with tools having hard-alloy cutting tips and also on "steel 40X" using low-alloy high-speed steel tools, the latter being cooled during cutting. Data on the influence of tool wear on microfinish of the surface, of time of work and cutting speed on tool wear, and of tool wear and cutting speed on surface finish. (G17)

269-G. Dependence of Applied Force on Rate of High-Speed Cutting of Metals. (In Russian.) T. N. Lopadze and A. I. Betaneli. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, May 1950, p. 16.

Dependence of cutting force on cutting rate and on lead angle of cutting tool was investigated. Influence of cutting rate is explained on the basis of its temperature effect on cutting and on rate of deformation. (G17)

270-G. Cylinder Head Broaching Tools Feature Carbide Inserts. *Iron Age,* v. 166, Aug. 17, 1950, p. 96-97.

It was found that broaching cutters with carbide-tipped roughing teeth and solid carbide blade-type finishing teeth increase between-grind life of the blades from 3000 to 65,000 pieces in finishing two faces and two sides of a gray-iron cylinder-head casting. (G17, T6, CI, C)

271-G. Fabrication of Titanium and Zirconium. A. M. Bounds and H. W. Cooper. *Metal Progress,* v. 58, Aug. 1950, p. 185-188.

Practical information of commercial value on bending, drawing, forming, machining, and welding. (G general, K general, Ti, Zr)

272-G. Dies for a Malleable Production Foundry. K. L. Sanders. *American Foundryman,* v. 18, Aug. 1950, p. 24-26.

Dies used in the straightening of castings to produce dimensional accuracy. (G1, E24, CI)

273-G. Airspeed Ambassador. Part I. General Design and Basic Manufacturing Methods; Hole-Piercing; Rubber-Die Press-Forming. Section-Manipulation. Part II. Forming Reflexed Components on the Hufford Machine;

Press-Brake Technique; Fuselage Structure, Frame-Subassemblies, Stringer-Drilling. S. C. Poulsen. *Aircraft Production,* v. 12, July 1950, p. 213-219; Aug. 1950, p. 241-247.

Equipment and procedures for manufacture of British plane. (To be continued.) (G general, T24, Al)

274-G. Nickel-Alloy Sheet; Some Notes on Spinning, Drawing, Shearing and Perforating Monel, Nickel and Inconel. *Aircraft Production,* v. 12, Aug. 1950, p. 257-259.

(G general, Ni)

275-G. (Book) **Machining — Theory and Practice.** 504 pages. 1950. American Society for Metals, 7301 Euclid Ave., Cleveland 3. $6.50.

Contains 13 papers by various authors on metal cutting, cutting fluid, materials and machinability, macrostructure, heat in metal cutting, and economics of machining. Papers are abstracted separately. (G17)

276-G. (Book) **Universal-Schnitt- und Stanzwerkzeuge.** (Universal Cutting and Forming Tools.) G. Oehler. 135 pages. 1950. Carl Hanser Verlag, Munich 27, Germany. 780 DM.

Press-tool design and construction, particularly the application of German standards for tool sets, the selection of die steels, and their correct heat treatment. Examples of blanking, forming, bending, curling, and deep drawing tool design. Considerable space is devoted to the calculation of working pressures for various component forms and materials. (G general, T6)

277-G. Small Short-Run Parts Made by Rubber-Die Process. William J. Bachman. *American Machinist,* v. 94, Aug. 21, 1950, p. 102-103.

Process by which small blanks and formed articles in thin, hard materials ⅛ in. or less in major dimension are produced. (G8)

278-G. Die Sinking for Drop Forging. Part IX. "Locked Dies". John Mueller. *Steel Processing,* v. 36, Aug. 1950, p. 398-401.

When the parting line in a die must change from one level to the other, because of irregular shape of the forging, a "lock" is created. This requires that the die-block faces that carry the forging impression must be machined at different heights. Equipment and procedures. (G16, F22)

279-G. Hydraulic Pressure Forms Gas Tanks. *Iron Age,* v. 166, Aug. 24, 1950, p. 76-77.

Douglas Aircraft developed a method for producing aluminum tanks in which partially formed tanks, after welding and heat treating, are formed by hydraulic pressure. Tank is placed inside the sizing die and hydraulic fluid is pumped into the retaining rubber bag forcing the metal against the die to the final contour. Time required is 3 min., pressure 400 psi. (G1, Al)

280-G. Oxy-Gasoline Cutting of Steel Under Water. (In Russian.) M. G. Makeev. *Avtogennoe Delo* (Welding), v. 21, May 1950, p. 14-16.

New designs of cutting torch for work under water. Optimum conditions of cutting and operating parameters. (G22, ST)

281-G. Cutting Steel With Low-Pressure Oxygen. (In Russian.) S. V. Begun. *Avtogennoe Delo* (Welding), v. 21, May 1950, p. 16-19.

Investigation revealed several basic advantages. A specially designed torch. (G22, ST)

282-G. Allegheny Ludlum Analyzes Drawing Characteristics of Stainless Steels. R. H. Henke. *Steel,* v. 127, Sept. 4, 1950, p. 88-90, 96, 98.

See abstract of "The Drawing of Stainless Steels," *Tool & Die Journal,* item 206-G, 1950. (G4, Q24, SS)

283-G. Can You Friction Saw Nickel-Base Alloys? H. J. Chamberland. *Steel,* v. 127, Sept. 4, 1950, p. 91-92.

Severe laboratory sawing tests reveal that Monels, Inconels, Hastelloys, and Illiums can be successfully cut by high-speed, band-friction methods. Economic factors. (G17, Ni)

284-G. What Causes Distortion in Machining Aluminum? K. R. Van Horn. *American Machinist,* v. 94, Sept. 4, 1950, p. 119-120.

Causes and remedies. (G17, Al)

285-G. 'Rheems' of Steel Shipping Containers. *Industry & Welding,* v. 23, Sept. 1950, p. 48.

Forming and welding of steel drums by Rheem Mfg. Co. (G11, K3, T26, CN)

286-G. Cutting Die Construction Costs. Cashly A. Henry. *Tool & Die Journal,* v. 16, Sept. 1950, p. 47-49, 64, 69.

Metal-forming and die construction details subject to patent application by the author. Dies are fabricated of steel strips and sheet, and mounted in press with rubber pads. Comparative cost analysis. (G8, T5)

287-G. Shafts Machined 500 Pct Faster With Carbides. Frank Haeger. *Iron Age,* v. 166, Sept. 7, 1950, p. 115-116.

Redesigned lathes and adoption of carbide tools have effected a big increase in Oldsmobile axle-shaft production. (G17, T6, C-n)

288-G. Machining of Heated Metals. E. T. Armstrong, A. S. Cosler, Jr., and E. F. Katz. *American Society of Mechanical Engineers,* Paper No. 50-S-5, 1950, 8 pages.

Effect of temperature on machinability, development of heating methods, and hot-machining with arc heating. Results for stainless, alloy, and toolsteels and for vitallium. (G17, AY, SS, TS, Co)

289-G. Modified Brake Used in Stretch Forming. Gilbert C. Close. *Finish,* v. 7, Sept. 1950, p. 17-19; *Light Metal Age,* v. 8, 1950, p. 6-7.

Stretch-forming equipment and procedure developed by Northrop Aircraft. The forming tool is an ordinary hydraulic metal brake with simple modifications that permit it to operate as a precision stretch press. Time required is reduced from 8 hr. to 2 min. for a typical wing section. (G9)

290-G. Production of Caterpillar Steering Clutch Cases. Arthur W. Johnson. *Machinery* (London), v. 77, Aug. 17, 1950, p. 195-201.

Press operations, welding, and machining at Caterpillar Tractor Co. (G1, G17, K general, T21, CN)

291-G. Equipment for Oxygen-Flux Cutting of Chromium and Chromium-Nickel Steels. (In Russian.) S. G. Guzov and O. Sh. Spektor. *Avtogennoe Delo* (Welding), v. 21, June 1950, p. 11-15.

Equipment in which particles of flux, preheated by an oxy-acetylene flame, burn in the jet of oxygen and release a large amount of heat, so that the superheated particles of oxides formed pass into the slag and liquefy, thus establishing conditions necessary for continuous cutting. Sheets of up to 150-mm. thickness may be cut. The basic component of the flux is iron powder. Optimum operating conditions for various thicknesses and types of steels. (G22, SS)

292-G. Deformation of Sheets During Oxy-Acetylene Cutting. (In Russian.) S. L. Petrov. *Avtogennoe Delo* (Welding), v. 21, June 1950, p. 15-20.

Mechanism of edge deformation and methods of preventing or of minimizing it. (G22, ST)

293-G. Cutters With Mechanically Attached Hard-Alloy Tips. (In Russian.) G. D. Shteinbok. *Torfyanaya Promyshlennost* (Peat Industry) v. 27, June 1950, p. 23-24.

Experimental and plant-scale investigations established suitability and advantages, especially for boring and turning lathes. (G17, T6, SG-j)

294-G. Homemade Unit Bends Magnesium Tubing. Herbert Chase. *Iron Age,* v. 166, Sept. 14, 1950, p. 101-102.

Tubing and channels for fabrication of light-weight industrial hand trucks are bent to shape on a homemade air-actuated bending machine. (G6, Mg)

295-G. The Cold Working of the Stainless Steels. Part I. Lester F. Spencer. *Steel Processing,* v. 36, Aug. 1950, p. 383-391, 397.

Characterisitcs of the various compositions, especially with respect to their amenability to the various cold working processes. Chemical composition ranges for the austenitic, martensitic, and ferritic types are tabulated. Tensile and yield strengths, elongations, bend-test data, and hardness of selected compositions in various tempers are tabulated. Various press, shear, punch, and other operations; recommended blanking methods. (To be continued.) (G general, Q general, SS)

296-G. Cartridge Cases From Round Stock. Arthur F. MacConochie. *Steel,* v. 127, Sept. 11, 1950, p. 88-91; Sept. 18, 1950, p. 108-110.

French process for forming small-arms cartridge cases from extruded brass rod. Material loss is said to be only 0.6% as compared to 34% discard in blanking from strip. The process has had extensive commercial application prior to World War II. Part II: metallographic studies of parts produced by progressive steps of the Manurhin process reveal excellent structural properties imparted to the brass by cold working. (G5, T2, Cu)

297-G. Evaluating Tool Performance. Thomas Badger. *Tool Engineer,* v. 25, Sept. 1950, p. 17-20.

Method developed by Westinghouse which accurately predicts shop results for cutting-tool materials. It is a simple lathe test, but experience has shown that it will accurately predict whether a tool material will perform satisfactorily or not. (G17, TS, C-n)

298-G. A Metallurgical Approach to Grinding Hardened Steel. L. P. Tarasov. *Tool Engineer,* v. 25, Sept. 1950, p. 24-27.

Fundamental causes of crack formation during grinding. Grindability, surface cracks, grinding sensitivity, crack detection, grinding burns, detection of burns, and trouble shooting. (G18, S13, ST)

299-G. Selecting Machining and Drawing Fluids. E. L. H. Bastian. *Tool Engineer,* v. 25, Aug. 1950, p. 23-25; Sept. 1950, p. 37-39.

Part I: Purpose of cutting and grinding fluids; soluble oils and emulsions; and application of cutting and grinding fluids. Part II: Classification of compounds; application to press drawing, bar and tube drawing, and rod and wire drawing. (G21, F1)

300-G. How To Cut Costs With Cutting Fluids. E. J. Tangerman. *American Machinist,* v. 94, Sept. 18, 1950, p. 109-116.

Special report. (G21)

301-G. The Merry Go Round for Metal. Richard Cheney. *Steelways,* v. 6, Sept. 1950, p. 18-20.

World's largest spinning and flanging equipment, used for making steel tank heads weighing as much as 17½ tons. Also equipment for producing small-sized spun pieces. (G13, ST)

302-G. Cutting Cast Iron. R. L. Vining. *Welding Journal,* v. 29, Sept. 1950, p. 765-766.

Special cutting technique used to cut cast iron with a standard oxy-acetylene blowpipe. (G22, CI)

303-G. Which Coolant? Lawrence Suhadolnik. *Steel,* v. 127, Sept. 25, 1950, p. 77-78, 80.

Development of formula based on weighing tool wear. Tests show the varying amounts of wear which are caused by different types of coolants. (G21)

304-G. High-Speed Machining: An Analysis. Ivan A. Swidlo. *Iron Age,* v. 166, Sept. 28, 1950, p. 70-73.

Results of tests at speeds up to 1200 surface ft. per min. which reveal information about tool shape, coolant, chip formation, and other factors. Analysis of cutting-wedge formation aids in understanding of tool performance. Photomicrographs show distortion of grain structure below machined surfaces. (G17)

305-G. Push-Pull Rods and Torque Shafts. J. J. Sloan. *Western Machinery and Steel World,* v. 41, Sept. 1950, p. 74-77.

Advantages and disadvantages of various methods for production of rod and shaft joints. Most commonly used alloys are 24S-T Al and SAE 4130 steel. Recently perfected knurled-swaged method of manufacture shows superior joint strength over the more commonly used riveted joint in both static and fatigue testing, and requires less than half the time for assembly. (G12, T7, Al, AY)

306-G. Drawing Chromium-Nickel Stainless Steels. Robert H. Henke. *Steel Horizons,* v. 12, Fall 1950, p. 18-19, 22.

Technical data on mechanical properties and drawing characteristics of several types of stainless. Refers principally to the drawing of hollow shells from flat metal blanks. (G4, SS)

307-G. A Review of Published Information on the Deep Drawing of Non-Ferrous Metals. Marjorie Whitaker. *Sheet Metal Industries,* v. 27, Sept. 1950, p. 815-824.

Some of the troubles encountered such as stretcher-strain markings, critical-strain, grain growth, and earing, with special attention to the light alloys. Special techniques in the production of sheet, designed to overcome deep-drawing difficulties. Optimum average grain size of sheet for deep drawing, deep drawing at elevated temperatures, and the relation of deep drawing properties to mechanical properties. Brief notes on deep drawing techniques for individual metals. 53 ref. (G4, EG-a)

308-G. Hot Brass Pressing. J. D. Hollingworth. *Metal Industry,* v. 77, Sept. 8, 1950, p. 131-134.

Relative merits of different types of equipment and procedures for hot stamping of brass. (G3, Cu)

309-G. Effect of Alternating and of Impact-Type Stresses on the Life of Steel Under Alternating Bending Stresses. (In German.) Alfred Drozd, Erich Gerold, and Ernst Hermann Schulz. *Archiv für das Eisenhüttenwesen,* v. 21, May-June 1950, p. 181-189.

Experiments on two low and one medium-carbon steel show that a briefly applied stress followed by a higher stress increases strength of the steels, but reduces it greatly when followed by a lower stress. This phenomenon may be explained by the "training" effect of alternating stresses below the fatigue limit. (G23, CN)

310-G. Deep Drawing (Cupping) of Steel (Neumeyer Deep-Drawing Process). (In German.) Hubert Hauttmann. *Archiv für das Eisenhüttenwesen,* v. 21, July-Aug. 1950, p. 235-242.

Effect of lubricants, shape of the dies, and relationship of reduction in cross section to properties of the materials. Eleven carbon steels (compositions given) were studied. Tests developed to determine the plasticity of the metal before drawing and another to determine transverse strength of the wall of the drawn cylinder. (G4, Q23, CN)

311-G. Stainless Steel Fabrication for Aero Engines. *Welding,* v. 18, Sept. 1950, p. 382-390.

New developments in die forming and arc and resistance welding at Solar Aircraft Co., San Diego. (G1, K1, K3, SS)

312-G. The Cold Working of Stainless Steel. Part II. Bending Operations. Lester F. Spencer. *Steel Processing,* v. 36, Sept. 1950, p. 440-446.

Clarified by numerous diagrams and illustrations. Draw rolling or roll forming. (To be continued.) (G11, SS)

313-G. How To Lap. Miles J. Rowan. *American Machinist,* v. 94, Oct. 2, 1950, p. 97-108.

Principles of lapping and methods by which the operation is performed. Particular attention is devoted to mechanical lapping with general-purpose equipment. Different machines and the requirements of typical workholders for representative classes of work. Hand lapping, gear lapping and the lapping of camshafts and crankshafts. (G19)

314-G. Structures and Machinability of Carbon Steels. *American Machinist,* v. 94, Oct. 2, 1950, p. 125, 127.

Effects of rolling and rolling plus cold drawing upon machinability of AISI compositions C1008 through C1045 and C1109 through C1141, including resulfurized steels. (G17, M27, CN)

315-G. Microscope Method Expedites Machinability Tests. Thomas Badger. *Iron Age,* v. 166, Oct. 5, 1950, p. 79-83.

Novel method for determining machinability which utilizes microscopic measurement of tool wear and graphical determinations based on tool-wear rate. The method is very accurate, and much faster than conventional machinability tests. (G17)

316-G. Oxygen Cutting of Steel of Large Cross Section. (In Russian.) K. K. Khrenov and M. M. Bort. *Avtogennoe Delo* (Welding), v. 21, July 1950, p. 5-9.

On the basis of a theory that the pressure of oxygen required depends on thickness of the metal being cut, a new nozzle was designed with a maximum pressure of 2.5-3.5 atm. At this pressure, the jet flows at supersonic velocity, so that the energy of the compressed gas is almost all transformed into kinetic energy and the jet does not spread out. Thicknesses of 500-2000 mm. may be cut. Torch and operating data. (G22, ST)

317-G. Rapid Gas Cutting of Pipes. (In Russian.) A. I. Brodskii, A. N. Iroshnikov, P. G. Rybalka, and G. M. Ryazanov. *Avtogennoe Delo* (Welding), v. 21, July 1950, p. 21-23.

Applicability of tangential gas (oxy-acetylene) and electric-arc cutting under flux of 250-650 mm. diam. and 3-8 mm. wall thickness steel pipes while being rotated at a rate of 2.7-3.5 meters per min. Automatic preheating at the place to be cut was also studied. Gas cutting was found to leave smooth clean edges which eliminate the need for further mechanical treatment. (G22, ST)

318-G. Lead Coating Steel Wire? Possibilities Discussed. *Wire Industry,* v. 17, Sept. 1950, p. 731-732. (G4, G21, Pb, ST)

319-G. Hot Forming of Aluminum and Magnesium Alloys. T. E. Piper. *American Society for Metals,* Preprint No. 36, 1950, 18 pages.

Results of experimentation at Northrop Aircraft, Inc. Methods of heating and their limitations, effect of time and temperature on mechanical properties, heating time vs. cross-sectional area, and methods of temperature control. Compares hot forming in the heat treated condition vs. forming in the annealed condition. (G general, F21, J general, Al, Mg)

320-G. Grindability of Tool Steels. L. P. Tarasov. *American Society for Metals,* Preprint No. 42, 1950, 25 pages.

Experimental procedure for determining grindability. Effects of quenching medium, alloying elements, microhardness of carbide particles, and Rockwell hardness. Also considers finishability. (G18, J2, Q29, TS)

321-G. Cold-Forming Large Nuts at High Speed. Jack B. Springer. *Machinery* (American), v. 57, Oct. 1950, p. 157-160.

Equipment and procedures of Industrial Nut Corp., Sandusky, Ohio. The cold forming machine is equipped with a five-station transfer mechanism. Rates of 42 per min. are achieved. Material is AISI C-1109. (G1, T7, CN)

322-G. Production Rates Increased With Fast Cutting Screw Steel. Henry J. Holquist. *Machinery* (American), v.

57, Oct. 1950, p. 177-178.

Increases made possible by use of Inland Steel's "Ledloy"—an open-hearth screw steel of approximately the same analysis as C-1113, but containing 0.15-0.25% Pb for improved machinability. (G17, CN)

323-G. Bending and Twisting Carbide Tools. David Kauffman. *Tool Engineer,* v. 25, Oct. 1950, p. 24-26.

Methods for producing various shapes. (G6, C-n)

324-G. The Stress Distribution in the Continuous Chip; A Solution of the Paradox of Chip Curl. E. K. Henriksen. *American Society of Mechanical Engineers,* Paper No. 50-SA-9, 1950, 12 pages.

Stress analysis for the chip which gives an explanation of downward concave curvature of the "plane of shear", "chipping off" of thin layers forming the built-up edge, and structure of deformation in the chip. (G17)

325-G. (Book) Machining of Zinc Alloy Die Castings. 69 pages. 1949. Zinc Alloy Die Casters' Assn., Lincoln House, Turl St., Oxford, England.

Types of tool used and applications. (G17)

326-G. (Book) Modern Workshop Technology. Part 2. Machine Tools and Metrology. H. Wright Baker, editor. 520 pages. 1950. Cleaver-Hume Press, Ltd., 42a S. Audley St., London W.1, England. 32s. net.

A symposium of articles by experts in the respective topics covering all types of machine tools and machining processes, also specialized subjects such as surface measurements, sheet metal drawing, broaching, gear cutting, lubrication, etc. Includes section on human relations in the factory and chapter bibliographies. (G general, G17)

327-G. Cold Extrusion of 105 MM. Shells Saves Steel. D. I. Brown. *Iron Age,* v. 166, Oct. 19, 1950, p. 69-75.

Process at Mullins Mfg. Corp. is said to cut steel requirements by 40% over previous forging methods. Mn content of the steel grade is also cut in half and no heat treatment is necessary. Better tolerances, both on weight and size, are obtained and steel quality is less critical in cold extrusion than in hot forging. (G5, CN)

328-G. Designing Around a Process. R. F. Helmkamp. *Welding Journal,* v. 29, Oct. 1950, p. 887-892.

Specialized flame-cutting equipment and its varied applications in production. (G22)

329-G. Pratt & Whitney Draws Tough Alloys to Close Limits. Robert M. Treat. *Steel,* v. 127, Oct. 23, 1950, p. 68-70.

How aircraft engine parts containing 80% Ni and 20% Cr are made on hydraulic presses to tolerances that eliminate machining. (G4, T24, Ni)

330-G. Fundamentals of the Working of Metals. George Sachs. *Modern Industrial Press,* v. 12, Oct. 1950, p. 6, 8, 10, 46.

Development of compressive stresses in drawing processes; drawing of rod and wire; cupping and shrink flanging; tube drawing, redrawing and reducing processes; drawing failures; drawability; ductility and intermediate anneals; and prevention of wrinkling and puckering. (G4, F26, F27, F28)

331-G. Trion Electric Air Filters Bustling Newcomer in Metalworking Industry. Walter Rudolph. *Modern Industrial Press,* v. 12, Oct. 1950, p. 22, 24, 26, 28.

Equipment and procedures for production of equipment for electrostatic cleaning and purifying of air and other gases. Processes include shearing, stamping, bending, and other press operations; oxyhydrogen and arc welding; and enameling. (G1, K1, K2, L26)

332-G. Design Makes the Difference. Stephen Baur. *Iron Age,* v. 166, Oct. 26, 1950, p. 61-65.

Examples in which redesign resulted in greater sales appeal because of appearance and performance improvements, also in lowered manufacturing costs. (G general)

333-G. Stamping Deep Drawn Parts at Transue-Williams. John C. McComb. *Steel Processing,* v. 36, Oct. 1950, p. 491-498.

Equipment and procedures. Emphasizes production of engine oil pans. (G3, ST)

334-G. Stretch Wrap Forming Saves Cost—Speeds Production at North American Aviation Inc. J. J. Sloan. *Western Metals,* v. 8, Oct. 1950, p. 34-36.

(G9)

335-G. Efficient Oxygen Cutting; Methods of Achieving Accurate Results. Lewis L. Arundel. *Welding,* v. 18, Sept. 1950, p. 399-403; Oct. 1950, p. 442-445.

Theory and practical recommendations for proper torch adjustment. Diagrams show proper appearance of flame. Part 2: various factors influencing accuracy of the cut. Available fuel gases compared. Suggestions regarding tolerances for different classes of work. (G22)

336-G. Investigation of Lubrication Effect During Deep Drawing by Use

of a Model. (In Russian.) S. Ya. Veiler, L. A. Shriner, and P. A. Rebinder. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, July 21, 1950, p. 511-513.

Proposes a new method for the above, based on deep drawing of a plate. The method permits determination not only of tangential forces of drawing, but also radial-compressive forces for different degrees of deformation. By use of this method, it is also possible to investigate deep-drawing lubricants and to determine the deep drawability of metals. (G4, G21)

337-G. **Die Cost Cut by Tool Shop Foundry.** Walter G. Patton. *Iron Age,* v. 166, Nov. 2, 1950, p. 81-83.

Zinc alloy foundry of Richard Bros. Div., Allied Products Corp., Detroit, tool and die manufacturers. The low-cost dies produced are used for die-design tryouts on difficult stampings before permanent tooling is considered. They are also ideal for short or experimental runs. (G3, E general, Zn)

338-G. **A Comparison of Methods for Cutting Hardened Steel.** H. J. Chamberland. *Production Engineering & Management,* v. 26, Nov. 1950, p. 65-68.

Recent developments in the use of Al_2O_3 matrices for straight-line and contour cutting of hard materials suggest many possibilities for economies when the surface finish is important. (G17, ST)

339-G. **Welded Rail Costs Trimmed.** *Welding Journal,* v. 29, Nov. 1950, p. 1002.

Hot-trimming device, used for the first time on the Illinois Central continuous welded-rail program in South Chicago, which has reduced grinding operations to one-fifth of the usual amount. (G22, CN)

340-G. **New Lathes Bore and Rough Turn at Record Rates.** C. W. Heppenstall. *Iron Age,* v. 166, Nov. 9, 1950, p. 85-87.

Two lathes, developed in Germany and shortly to be built in the U. S., operate at rates well in excess of current American practice. A trepanning lathe bores holes in forgings at rates as high as 41 ft. per hr. A rough turning lathe can remove metal at rates up to 2000 lb. per hr. in forgings up to 33 ft. long. (G17)

341-G. **Machinability Research Program Reported.** *Iron Age,* v. 166, Nov. 9, 1950, p. 99-102.

Summarizes new book published by Curtiss-Wright Corp., which gives details of work sponsored by the U. S. Air Force and participated in by Ford Motor Co., Metcut Research Associates, and M.I.T., as well as Curtiss-Wright. Mechanical and machining properties of high-temperature alloys, flake and nodular cast iron and cast steel. (G17, SG-h, CI)

342-G. **Producing Hollow Steel Aircraft Propeller Blades.** George H. DeGroat. *Machinery* (American), v. 57, Nov. 1950, p. 137-143.

Equipment and procedures for production from high-alloy steel. Operations include honing, cold taper rolling, swaging and crimping, hot forming, stretch forming, seam welding, sand blasting, grinding, and milling. (G general, K3, L10, T24, AY)

343-G. **Hot-Joggling Aluminum Extrusions.** Thomas E. Piper. *Machinery* (American), v. 57, Nov. 1950, p. 144-148.

Equipment and procedures for above press-forming operation, applied by Northrop Aircraft to miscellaneous 75S-T Al parts. Comparison of oil-immersion and electrical resistance heating methods. (G1, J2, Al)

344-G. **Some New Concepts in Bending.** Ralph M. Shaw, Jr. *Machinery* (American), v. 57, Nov. 1950, p. 149-152, 165.

The four basic bending processes: compression, draw, roll, and ram. How to avoid wrinkling during bending and how to avoid springback. New adaptations of old methods. (G6)

345-G. **Dry Drawing Lubricants for Deep Drawing Operations.** Richard F. Roy. *Finish,* v. 7, Nov. 1950, p. 27-28, 75-76.

Characteristics and methods of application to steel. (G21, ST)

346-G. **"Curvilineal" Machining Now in Bailiwick of Planers, Shapers.** Guy Hubbard. *Steel,* v. 127, Nov. 13, 1950, p. 94-97.

How traditional limitations of planers and shapers to machining of shapes by the projection of straight lines are removed by use of hydraulic tracer-controlled tooling. (G17)

347-G. **Press Forming Aluminum Alloys.** E. V. Sharpnack. *American Machinist,* v. 94, Nov. 13, 1950, p. 171, 173.

Recommended procedures as related to the various types. Shear, yield, and tensile strengths, also percent elongations, are tabulated for 35 alloy-and-temper combinations. (G1, Al)

348-G. **Hawaii Scraps Its Big Guns.** W. R. Laurance. *Welding Engineer,* v. 35, Nov. 1950, p. 20-21.

How obsolete guns were cut up by use of oxy-acetylene torches. (G22, CN)

349-G. A Systematic Investigation Into the Band-Saw Cutting of Aluminium and Its Alloys. E. Von Burg. *Engineers' Digest,* v. 11, Oct. 1950, p. 349-352. Translated and condensed.

Previously abstracted from *Schweizer Archiv für angewandte Wissenschaft und Technik.* See item 129-G, 1950. (G17, Al)

350-G. Presswork Production; An Examination of the Technique of Using Progressive Tools. R. Kirchner and G. V. Bevan. *Sheet Metal Industries,* v. 27, Oct. 1950, p. 851-870.

A survey of various types of progressive tools and some of the advantages and disadvantages of this method of tooling. (G1)

351-G. Bent Structural Members: Some Aspects of the Design and Manufacture of Formed Aircraft Parts. Part I. Bending by Semi-Concentrated Loads and by Stretch-Bending. Part II. Heat Treatment and Strength Values of Aluminium-Alloy Materials. Incidence of Sheet-Forming Operations. R. M. Howarth. *Aircraft Production,* v. 12, Aug. 1950, p. 252-256; Sept.-Oct. 1950, p. 294-296.

The possible effects upon Al alloy structural materials of different methods of deformation. Results of bending by semi-concentrated loads and by stretch-bending; points out that finished products made by the two methods, although superficially alike, are, in fact, totally dissimilar. Concluding installment: The relation of heat treatment to the forming operation. Recommendations as to the most suitable stage for forming operations. (G6, J general, Al)

352-G. Joggling. *Aircraft Production,* v. 12, Sept.-Oct. 1950, p. 280-281.

Practice of North American Aviation Corp. in manipulating extrusions and formed-sheet sections of Al alloys and stainless steel. (G1, Al, SS)

353-G. Hot-Dimpling. *Aircraft Production,* v. 12, Sept.-Oct. 1950, p. 289-291.

Process for high-strength light-alloy sheet developed by Short Brothers and Harland, Ltd., in Britain. (G2, Al)

354-G. Erosion Boring. (In German.) W. Brunst. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, Sept. 11, 1950, p. 750-751.

How holes can be drilled through the hardest steel by use of an underwater arc between an electrode and the steel. (G22, ST)

355-G. Flexibility Key to Efficient Gear Production. John Elwood. *Iron Age,* v. 166, Nov. 16, 1950, p. 83-86.

Equipment and procedures for mass production of over 200 types of gears, plus much job-lot production, at Caterpillar Tractor Co. (G17)

356-G. The Cold Working of the Stainless Steels. Part III. Shallow and Deep Drawing. Lester F. Spencer. *Steel Processing,* v. 36, Oct. 1950, p. 504-509.

Compares cold workability of the various types. (To be continued.) (G4, SS)

357-G. Design Simplicity Key to Blower Wheel Manufacture. *Steel,* v. 127, Nov. 20, 1950, p. 100-102.

Procedures and equipment. Process includes stamping, automatic screw-machine operations, drilling, and tapping, rolling, assembly, and inspection. Materials are steel and aluminum. (G general A5, S general, Al, ST)

358-G. The Fabrication of Wrought Magnesium. Part I-II. Deep Drawing. Fred L. Church. *Modern Metals,* v. 6, Oct. 1950, p. 31-34; Nov. 1950, p. 42-45.

Deep drawing presses and dies, the heating of dies, and lubricating practice. Illustrates recommendations by giving step-by-step description of a B-36 bomber part known at a "waffle grid". This part is used to stiffen the unsupported trailing edges of the wings. It is applied by resin bonding. (To be continued.) (G4, T24, Mg)

359-G. The Fabrication of Magnesium Assemblies. J. S. Kirkpatrick. *Modern Metals,* v. 6, Nov. 1950, p. 27, 29, 31.

Methods used by Brooks & Perkins, Detroit, for drawing, die forming, stretch forming, hydro forming, hand forming, gas-shielded arc welding, riveting, and adhesive bonding of wrought Mg. (G general, K general, Mg)

360-G. The Oxygen Lance for Burning Holes in Concrete, Minerals, and Steel. (In German.) R. Wolf and E. Zorn. *Schweissen und Schneiden,* v. 2, June 1950, p. 154-157.

Principles of the equipment, effect of quantity of oxygen, and of concrete or mineral composition. The cutting of holes in steel. Thermal efficiency is charted. (To be continued.) (G22, ST)

361-G. Experimental Investigation of Fine Turning. (In Russian.) A. G. Nalchan. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Aug. 1950, p. 18-19.

Investigated with respect to cutting forces, character of wear of the cutting edge, temperature of

cutting, influence of turning on fineness of the worked surface, and possibility of replacing diamond with metallic tips. Special apparatus designed for the investigation. (G17)

362-G. Operation of an Auxiliary Cutting Edge. (In Russian.) S. F. Glebov. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Aug. 1950, p. 21-24.

Investigation to determine the nature of the process of secondary cutting and the mode of action of the secondary edge. Theory of the process of auxiliary cutting developed on the basis of experimental results permits logical design of cutting tools for different applications. (G17)

363-G. The Problem of Treatment of Results of Investigation of Cutting of Metals. (In Russian.) N. I. Leonov. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Aug. 1950, p. 24.

The best method of plotting the relationship of time required for dulling to cutting speed; recommends use of log-log charts. (G17)

364-G. Cutting Torches Operating on Combustible Gases Substituted for Acetylene. (In Russian.) A. K. Winburg. *Avtogennoe Delo* (Welding), v. 21, Aug. 1950, p. 22-23.

Experimental investigation of the applicability of natural gas, methane, city gas, and coke-oven gas instead of acetylene to flame cutting of low-carbon steel plate up to 300 mm. thick. (G22)

365-G. (Book) **Principles of Stretch-Wrap Forming.** 87 pages. 1950. Hufford Machine Works, Inc., 207 North Broadway, Redondo Beach, Calif. $5.

Attempts to clarify many ideas and to include as much tooling information and as many actual operating examples as are available at present. The theory, advantages, and uses of stretch-wrap forming equipment in modern aircraft manufacture; detailed tooling procedures and form-die construction data. Courtesy copies will be sent to foremen, superintendents, and executives in the aircraft industry.
(G9, T24, Al, Mg)

366-G. (Book) **Werkzeug-Handbuch über Schneidwerkzeuge für die Metallbearbeitung.** (Tool Handbook on Cutting Tools for Metal Working). F. Pütz. 418 pages. 1950. Carl Hanser Verlag, Munich 27, Germany. 34 DM.

A guide for the purchaser of tools and an aid to the engineer and machinist in the correct selection of the proper tool for a specific application. Characteristics, applications, and limitations of various types of drills, reamers, milling, cutting, threading, and other tools. Efficiency of various toolsteels in the machining of different metals and alloys. A section on maintenance and care of tools is included. (G17, TS)

367-G. Cutting Metal-Cutting Costs. *Modern Industry,* v. 20, Nov. 15, 1950, p. 38-43.

Ideas apply to other materials as well as metals. Includes numerous illustrations of unusual machine-tool equipment. (G17)

368-G. Portable Shear Handles 1-Inch Rod. Evans Jasper. *Iron Age,* v. 166, Nov. 23, 1950, p. 74-76.

Newly developed portable hydraulic unit capable of cutting rod up to $\frac{1}{8}$ in., cable up to $3\frac{1}{2}$ in., wire rope up to $1\frac{1}{4}$ in., and chain up to 1 in. in diam. It has been found relatively simple to modify the units to perform specialized cutting, punching, swaging, riveting, and pressing operations for all types of industry, where portability, capacity, and compact size of the equipment is advantageous. (G15)

369-G. The Action of Cutting Fluids in Machinery. M. Eugene Merchant. *Iron and Steel Engineer,* v. 27, Nov. 1950, p. 101-107; discussion, p. 107-108.

See abstract of "Fundamentals of Cutting Fluid Action," *Lubrication Engineering,* item 238-G, 1950. (G21)

370-G. Magnesium Sheet Hot Formed at Less Cost. Gilbert C. Close. *Steel,* v. 127, Nov. 27, 1950, p. 56-58.

Tests at Douglas Aircraft show that staging operations in drop-hammer forming can be eliminated. Parts formerly formed in two parts and then welded can now be stretch formed in one piece. (G9, Mg)

371-G. Choose From 24 Cutoff Dies. J. R. Paquin. *American Machinist,* v. 94, Nov. 27, 1950, p. 96-98.

Diagrams show 24 types with brief description of applicability of each. (G2)

372-G. Die Life Test Cuts Cost of Laminations. A. T. Hamill. *American Machinist,* v. 94, Nov. 27, 1950, p. 100-102.

Results of controlled tests on lamination punches and dies which establish superiority of carbide over cast nonferrous alloys, and of carburized high speed steel over high-carbon, high-chromium types. Test procedure and apparatus.
(G2, T5, C-n, SG-j, TS)

373-G. Air Force, Curtiss-Wright, Ford, Metcut Report Proves Machinability Depends on Microstructure. Rupert Le Grand. *American Machinist,* v. 94, Nov. 27, 1950, p. 109-124.

Summary of complete report on cooperative research project recently published by Curtiss-Wright Corp. The work done on irons and steels,

plus additional data and its practical application by Ford to the manufacture of automobile parts at less cost. Includes comparisons of turning, drilling, and milling of cast iron, cast steel, and nodular iron. (G17, M27, CI, ST)

374-G. Magnesium Tubing Spun and Brazed to Produce Critical Part. Don C. Law. *Materials & Methods,* v. 32, Nov. 1950, p. 65-67.

Production of floats for hydraulic automobile lifts. Corrosion has caused occasional failures in the past. The floats are plated with Zn, Cu, and Cd.
(G13, K8, T21, Mg)

375-G. Sheet Steel Into Office Equipment. H. N. Acker. *Canadian Metals,* v. 13, Nov. 1950, p. 24-26.

Equipment and procedures. Includes mechanized handling, shearing, punching, bending, forming, spot welding, phosphating, and spray painting.
(G general, K3, L14, L26, T10, CN)

376-G. The Aluminum Bearing, Non-Aging Steels and Their Cold Extrusion. H. Hauttman and H. J. Pessl. *Steel Processing,* v. 36, Nov. 1950, p. 557-564, 583.

Advantages of process developed in Germany during the last war. This material and time-saving forming method, far from being limited to Ordnance production, is rapidly extending its application into many new fields of steel fabrication. Mechanical-property requirements and behavior of steels to be cold extruded; principles of the process. Different applications of the method. (G5, CN)

377-G. The Cold Working of the Stainless Steels. Part IV. Lester F. Spencer. *Steel Processing,* v. 36, Nov. 1950, p. 570-575, 587.

Choice of tool materials, lubricants, spinning, cold heading, press equipment, and drawing pressures. 23 ref. (G general, SS)

378-G. Uses of Oxy-Acetylene Processes in the Steel Fabricating Industry. Charles I. Orr. *Steel Processing,* v. 36, Nov. 1950, p. 577-579, 586.

Miscellaneous uses in flame cutting, welding, heating, straightening, scarfing, etc.
(G22, K2, ST)

379-G. Super High-Speed Steels Set New Production Record. P. Leckie-Ewing. *Iron Age,* v. 166, Dec. 7, 1950, p. 115-118.

Greater wear than standard high speed steels and higher toughness than cast alloys and carbides are said to justify the extra cost of super high speed steels. Greatest efficiency is obtained at feeds about twice as great as with standard high speed tools. Hot hardness is 20-30% greater than for standard grades. All of these steels are characterized by a high alloy content, especially of Co and/or V, frequently coupled with a high carbon content.
(G17, Q9, Q29, TS)

380-G. Magnetic Tracing—A Flame Cutting Production Aid. H. G. Frommer. *Modern Machine Shop,* v. 23, Dec. 1950, p. 90-98, 100, 102, 104, 106, 108, 110, 112, 114.

Fundamentals of magnetic tracing and several practical applications. (G22)

381-G. Progressive Dies Make Precision TV Parts. Rupert LeGrand. *American Machinist,* v. 94, Dec. 11, 1950, p. 133-136.

Two outstanding examples are stainless steel collars for the electron gun of the picture tube (stamped out in two halves and spot welded), and brass shield bases. Seven stations are used for the first and 15 stations for the latter part. Details of each step.
(G3, SS, T1, Cu)

382-G. Induction Heat + Versatile Fixture = Doubled Production. W. R. Yeakel. *American Machinist,* v. 94, Dec. 11, 1950, p. 164-165.

Special fixture easily adjustable for diameter and length which makes it possible to apply induction heating to heading of large bolts, cutting equipment requirements in half. (G10)

383-G. Polishing and Finishing True Temper Products. N. J. Benton. *Products Finishing,* v. 15, Dec. 1950, p. 66-68.

Mechanical finishing of shovels at Shelton Works, True Temper Corp., Dunkirk, N. Y. (G19, L10, CN)

384-G. Production Pointers for Machining Stainless Steels. *Production Engineering & Management,* v. 26, Dec. 1950, p. 53-57.

Many of the difficulties encountered in the machining of stainless steels can be avoided by following the recommendations given.
(G17, SS)

385-G. Fundamentals of the Working of Metals. Part XVII. Tension Type Working Processes. George Sachs. *Modern Industrial Press,* v. 12, Nov. 1950, p. 6, 8, 10.

Stretch forming, stretching, and stretch flanging. Tension failures, forming limits, dimensional changes, and buckling failures in stretching processes. (G9)

386-G. Time Studies Show Production Increases With Lead Bearing Screw Steel. Henry J. Holquist. *Tool & Die Journal,* v. 16, Dec. 1950, p. 54-56.

Typical studies in which "Ledloy" was compared with B-1113 with respect to machining time and speed. (G17, CN, SG-k)

387-G. How Flat Can You Get? *Fortune,* v. 42, Dec. 1950, p. 115-118, 120, 122.

Equipment and procedures for production of flat, smooth surfaces of extreme precision. Need of the automotive industry for putting such surfaces on hydraulic-transmission castings has led to mechanization of the old lapping process. Development of Johansson gage blocks which were the first example of precision hand lapping. Other uses of the lapping process. (G19)

388-G. Want To Do Better Cutting? Phil Glanzer. *Welding Engineer,* v. 35, Dec. 1950, p. 40.

Suggestions for setting torch-cutting tips. (G22)

389-G. Development of High Speed Toolsteels. (In German.) Robert Scherer and Winfried Connert. *Stahl und Eisen,* v. 70, Oct. 26, 1950, p. 984-994.

A brief history followed by a comprehensive survey of research on suitable compositions and uses since 1938. Schrupp lathe tests were made to determine optimum amounts of alloying elements (with due regard to their availability). Effects of W, Mo, V, Co, Ti, Cr, C, and Al on cutting efficiency of the steels. Nitrides (especially Al nitrides) improved the cutting efficiency of the steels. 33 ref. (G17, T6, TS)

390-G. Accuracy in Machining—Its Standardization and Cost. Tom H. Vogel. *Tool Engineer,* Nov. 1950, p. 17-19; Dec. 1950, p. 28-31.

Previously abstracted from *Engineers' Digest.* See item 236-G, 1950. (G17)

391-G. Contour Forming Speeds Bus Body Fabrication. *Steel,* v. 127, Dec. 18, 1950, p. 94-96.

Advanced manufacturing methods borrowed from the aircraft industry using combination of stretch forming and compression forming. Structural members formerly made in two or more sections and joined are now shaped in one piece, saving weight, fabrication and assembly time. (G1, Al, ST)

392-G. Grinding Fluids; A Method of Measuring the Metallic Wheel-Loading Characteristics. L. H. Sudholz, S. Manilych, and G. S. Mapes. *Mechanical Engineering,* v. 72, Dec. 1950, p. 963-965, 983.

Method for accurately recording and measuring metallic wheel loading involves chemical detection of metallic particles embedded on the surface of the grinding wheel. Another application is determination of the effectiveness of wheel dressing. Investigation of various fluids by this method. It appears that type of grinding fluid is one of the most critical factors in efficiency of grinding. (G18)

393-G. Production-Line Methods Employed in Building Elevators. W. G. Nutzel. *Machinery* (Aerican), v. 57, Dec. 1950, p. 148-154.

Production methods and new facilities employed at Otis Elevator Co. in manufacturing hollow metal doors and cabs for elevators. Materials used are stainless steel, bronze, Al, and hot and cold rolled steel sheets. Operations include press forming, stamping, shearing, arc welding, and finishing.
(G1, G3, G15, K1, L general, T26, SS, Cu, Al, ST)

394-G. Carbide Burs Simplify Difficult Machining Operations. George H. DeGroat. *Machinery (American),* v. 57, Dec. 1950, p. 155-158.

How hardened dies and molds are quickly altered without annealing, inaccessible corners and recesses are easily machined, and many other machining problems are solved by making use of carbide burs. Various types and their applications. (G17)

395-G. How To Stop That Waste In Machining. E. J. Tangerman. *American Machinist,* v. 94, Aug. 7, 1950, p. 99-114.

Special report consists of two articles: "Are We Riding the Brake in Machining Speeds" and "Machining Costs a Billion a Year Too Much". The first emphasizes the possibility of using greater speeds and the second the potentialities of postwar equipment. The "billion dollar" figure is based on a detailed survey of the number of units at least 10 years old in design and the per cent increase in productivity of 1950 machine tools over those of 1940. (G17)

396-G. (Book) **Increased Production, Reduced Costs Through a Better Understanding of the Machining Process and Control of Materials, Tools, Machines.** 162 pages. 1950. Curtiss-Wright Corp., Wood-Ridge, N. J.

Procedures for metal-cutting research. Carbide-tool selection and evaluation of machine tools for better productivity. Presents heretofore unpublished data on the best ways to machine high-temperature alloys, cast iron and steels in the light of their microstructures.
(G17, M27, SG-h, ST, CI)

SECTION H

POWDER METALLURGY

1H. Finished Stainless Powder Parts Mass-Produced in Wide Range of Shapes and Sizes. *Steel,* v. 125, Dec. 26, 1949, p. 55-56.

Compacting and sintering. (H14, H15, SS)

2H. The Formation of Alloys by Diffusion in Powder Metallurgy. (Concluded.) Pol Duwez. *Powder Metallurgy Bulletin,* v. 4, Nov. 1949, p. 168-174.

See abstract of Part I, item 5C-28, 1949. (H12)

3H. Sintering Carbides by Means of Fugitive Binders. L. S. Foster, L. W. Forbes, Jr., L. B. Friar, L. S. Moody, and W. H. Smith. *Journal of the American Ceramic Society,* v. 33, Jan. 1, 1950, p. 27-33.

See abstract of *U. S. Atomic Energy Commission,* AECD-2464, item 5C-11, 1949. (H15)

4H. Preparation of High Strength Shapes From Crystalline Boron. William W. Wellborn. *U. S. Atomic Energy Commission,* AECD-2732, July 19, 1948, 3 pages.

Powder-metallurgy technique. (H general, B)

5H. Metal-Ceramics. *Product Engineering,* v. 21, Jan. 1950, p. 141-142. Condensed from "Metal-Ceramics, A New Field in Powder Metallurgy", by Henry H. Hauner.

Includes tables giving electrical properties of ZrO_2-Fe_2O_3-Cu and TiO_2-Ni compositions; also melting points of metals, their oxides, and silicates. (H general, P15, P12)

6-H. Infiltration of Powder Metal Compacts With Liquid Metal. Paul Schwarzkopf. *Metal Progress,* v. 57, Jan. 1950, p. 64-68.

High-melting metal is first pressed to form a porous compact, and then the lower-melting metal is "infiltrated" as liquid into the pores of this skeleton. Products made by infiltration, with particular emphasis on the structure and properties of Fe-Cu mixtures. (H16, Fe, Cu)

7-H. Infiltrated Alloys. F. V. Lenel. *Metal Progress,* v. 57, Jan. 1950, p. 106, 108, 110. Translated and condensed from "The Preparation and Properties of Infiltrated Alloys", R. Kieffer and F. Benesovsky, *Berg- und Huttenmannische Monatshefte,* v. 94, 1949, p. 284.

Conditions necessary or favorable for preparation of alloys by infiltration; groups of such alloys which have become commercially important during the last 15 yrs. (H16)

8-H. Cemented Carbides Without Metallic Binders. F. V. Lenel. *Metal Progress,* v. 57, Jan. 1950, p. 110, 120, 122.

Condensed and previously abstracted from "Sintering Carbides by Means of Fugitive Binders", Laurence S. Foster, *U. S. Atomic Energy Commission,* AECD-2464, Jan. 28, 1949. (H15)

9-H. Powder Metallurgy; Review of Progress During 1949. R. A. Hetzig. *Metallurgia,* v. 41, Dec. 1949, p. 88-90.

Includes uses of metal powders in which they do not undergo the process of pressing and sintering. Applications are emphasized. 50 ref. (H general)

10-H. A Phenomenological Theory of Sintering. J. K. Mackenzie and R. Shuttleworth. *Proceedings of the Physical Society,* v. 62, sec. B, Dec. 1, 1949, p. 833-852.

Fundamental differences between the theory as applied to glasses and that for metals. Sphering of the pores; driving force and resistance to deformation; kinetics of sintering; theory of sintering; influence of gas; suggested experiments. 29 ref. (H15)

11-H. The Extrusion of Powdered Magnesium Alloys. R. S. Busk and T. E. Leontis. *Journal of Metals; Transactions of the American Institute of*

Mining and Metallurgical Engineers, v. 188, Feb. 1950, p. 297-306.

Direct extrusion of Mg-alloy powder was used to produce four new Mg-alloy types by controlled solid-state diffusion. The importance of the use of atomized powder, a new mechanism termed "interference hardening", a method for combating stress corrosion, and a method for increasing the hot-short speed of extrusions. 19 ref. (H14, Mg)

12-H. Behavior of Pores During the Sintering of Copper Compacts. F. N. Rhines, C. E. Birchenall, and L. A. Hughes. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Feb. 1950, p. 378-388.

Experimental studies of density and size distribution and shape of pores carried out on copper compacts sintered in vacuum, hydrogen, and argon for 1, 10, 100, and 1000 hr. at 800, 900, and 1000° C. A theoretical model was formulated, in terms of the vacancy mechanism of body diffusion, to account for changes in pore distribution and densification. 16 ref. (H15, Cu)

13-H. Powder Metallurgy Progress. R. A. Hetzig. *Chemical Age,* v. 62, Jan. 14, 1950, p. 79-82.

Reviews 1949 developments. 39 ref. (H general)

14-H. The Elastic Constants of a Solid Containing Spherical Holes. J. K. Mackenzie. *Proceedings of the Physical Society,* v. 63, sec. B, Jan. 1, 1950, p. 2-11.

Bulk modulus is determined by applying hydrostatic pressure, and shear modulus by applying a simple homogeneous shear stress to a large sphere. By using the hydrodynamic analogue of the elastic problem, the theory is briefly applied to the sintering process and used to discuss the effective viscosity of a liquid containing small air bubbles. (H15)

15-H. Production and Heat Treatment of Copper Powder. H. J. V. Tyrrell. *Engineering,* v. 169, Jan. 13, 1950, p. 51-53. A condensation.

Previously abstracted from *Journal of the Institute of Metals.* See item 5C-23, 1949. (H10, H11, Cu)

16-H. Recent Developments in Powder Metallurgy. Supplement to "Powder Metallurgy—Its Physics and Production". Part III. Paul Schwarzkopf. *Powder Metallurgy Bulletin,* v. 5, Jan.-Mar. 1950, p. 4-14.

Theoretical concepts. 61 ref. (H general)

17-H. Use of the Transverse Rupture Test To Evaluate a New Stainless Steel Powder. George Stern. *Powder Metallurgy Bulletin,* v. 5, Jan.-Mar. 1950, p. 15-16.

Use of testing method recently described by Scanlan and Seelig. As a result, two grades of more readily compactible stainless steel powders were developed: a straight 14% Cr grade; and a grade containing approximately 16.5% Cr and 8% Ni. Green strengths of compacts are tabulated. (H14, SS)

18-H. A Horizontal High Vacuum Electrical Resistance Furnace. W. E. Kuhn and O. W. Ellis. *Canadian Journal of Research,* v. 28, sec. F, Jan. 1950, p. 1-20.

Furnace used in production of sintered compacts of Ti and Ti alloys. The main contributory factor to high cost is degassing of refractories. The problem is to reduce the amount of refractories to be degassed to a minimum. Two methods of doing this are available—one employs a heat resistant alloy or metal within an insulated heated chamber; the other a refractory heater surrounded by an insulated radiation shield. The furnace was built according to the latter design. 11 ref. (H15, Ti)

19-H. Sintered Semiconducting Materials. Henry H. Hausner and Herbert B. Michaelson. *Ceramic Age,* v. 55, Feb. 1950, p. 78-80, 106-107.

Recent research on the development of semiconducting ceramic and metal-ceramic bodies. Although it is not believed that all of the variables have been identified, results of a large number and variety of experiments have led to a series of positive conclusions. 16 ref. (H general)

20-H. Making Jet Engine Compressor Blades by Powder Metallurgy. George Stern and John A. Gerzina. *Iron Age,* v. 165, Feb. 23, 1950, p. 74-77.

How infiltration of copper into an iron skeleton, plus sintering, coining, and heat treating, produce a high-strength blade cheaper than conventional forgings. (H16, T25, Fe, Cu)

21-H. Development of Powder Metallurgy; Important Contribution of the Metallwerk Plansee. *Chemical Age,* v. 62, Feb. 4, 1950, p. 195-198. Translated and condensed from report by R. Kieffer and F. Benesovsky, *Journal of the Technical Museum* (Vienna, Austria.)

Work of Austrian plant in development and production of powdered-metal products. (H general)

22-H. The Reduction of Tungsten Oxide With Hydrogen. I. Nature of the Metal Powder. (In Japanese.) Nobuji Sasaki and Ryuzo Ueda. *Science of Powder,* v. 3, no. 1, 1949, p. 1-7.

Microscopic observation revealed that the reduction product of a single WO_3 crystal consists of approximately 0.5μ particles, or "primary particles", which are single crystals formed by "atomic sintering" of W atoms produced by the reduction. If an oxide crystal lying on a surface is reduced, these primary particles remain scattered on the substratum, marking the exact contour of the original oxide crystal. But, if reduced in free space, they stick loosely together to form an aggregate or "secondary particle" which retains the original shape with about 30% contraction. If a mass of WO_3 crystals are reduced, secondary particles may cling loosely together to form "tertiary particles", etc. (H10, W)

23-H. Concerning the Structure of Porous Bodies. (In Japanese.) M. Kawakani. *Science of Powder,* v. 3, no. 1, 1949, p. 8-11.

Experimental work. (H11)

24-H. Effect of Powder Character Upon Compressing and Sintering Operation; Mainly Iron Powders Crushed by Stamp and Eddy Mills. (In Japanese.) Kazuhiko Ogawa and Toraji Nishijima. *Science of Powder,* v. 3, no. 1, 1949, p. 12-18.

Experimental data. (H14, H15, Fe)

25-H. Powder Metallurgy. Willard D. Labrum. *Journal of the American Society of Naval Engineers,* v. 62, Feb. 1950, p. 63-96.

History, processes, properties and applications. 24 ref. (H general)

26-H. Concerning the Kinetics of Sintering. (In German.) Gustav F. Hüttig. *Zeitschrift für Elektrochemie und angewandte Physikalische Chemie,* v. 54, Jan. 1950, p. 89-91.

Reviews the literature. Effect of time and temperature of sintering of Cu powder compacts on electrical conductivity, density, and sonic conductivity. Light and electron-microscope observations clarify the nature of the phenomena. 10 ref. (H15, Cu)

27-H. Electrolytic Production of Highly Dispersed Powdered Iron. (In Russian.) N. T. Kudryavtsev and E. A. Tereshkovich. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 22, Dec. 1949, p. 1298-1305.

Conditions of electrolysis (temperature, current density, etc.), and composition of electrolyte in order to obtain cathodic sponge iron. 11 ref. (H10, Fe)

28-H. Hot Pressing Beryllium Powder. A. U. Seybolt, J. P. Frandsen, and R. M. Linsmayer. *Steel,* v. 126, Mar. 27, 1950, p. 71-74, 96.

Previously abstracted from *U. S. Atomic Energy Commission,* AECD-2679. See item 5C-22, 1949. (H14, Be)

29-H. Some Thoughts on Powder Metallurgy. *Light Metals,* v. 13, Mar. 1950, p. 148-150.

Some recent publications and patents on production of high-strength, Al-alloy, powder-metallurgy products. (H general, Al)

30-H. Note on Surface Diffusion in Sintering of Metallic Particles. N. Cabrera. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Apr. 1950, p. 667-668.

In a recent paper Kuczynski studied the rate at which the crack between a metallic plane and a spherical particle of the same material is filled up gradually when heated at temperatures near the melting point. Law of growth of radius of contact between plane and sphere was studied and a relationship with time and a self-diffusion constant was deduced. The present author attempts to show, by mathematical analysis, that Kuczynski's equation is incorrect. (H15, N1)

31-H. Copper Powder Metallurgy Given Impetus by Japanese Utilizing of Pulp Mill Liquor. Kannosuke Hayami. *Mining World,* v. 12, Apr. 1950, p. 42.

New method of precipitating pure Cu powder from $CuSO_4$ solution. The solution is mixed with waste sulfite pulp liquor, the proportion varying with Cu content, and is digested for about 3 hr. at 140° C. (H10, Cu)

32-H. How Tooling Affects Design of Metal Powder Parts. Wm. M. Stocker, Jr. *American Machinist,* v. 94, Apr. 17, 1950, p. 89-96.

Molding and compacting equipment; fabrication and design of parts. (H14)

33-H. The Initiation of Reactions Between Solid Phases. A. Smekal. *Industrial Diamond Review,* new ser., v. 10, Mar. 1950, p. 73-76.

Previously abstracted from *Powder Metallurgy Bulletin.* See item 5A-57, 1949. (H12)

34-H. S.A.P.—An Aluminum Powder Metallurgy Product. (In Dutch.) K. J. van de Loo. *Metalen,* v. 4, Mar. 1950, p. 149-152.

Development, production, properties, and possible uses of improved material made by a new patented process. Graphic, tabular, and pho-

tographic comparison is made with "Avional M" and other similar products. (H10, Al)

35-H. Oil Cavity Increases Self Lubrication. Walter G. Patton. *Iron Age,* v. 165, Apr. 20, 1950, p. 91-92.

Production of powdered-metal parts with interior cavities which serve as oil reservoirs. The cavities prolong the self-lubricating properties of powdered-metal bearings by 500-600%. Materials are bronze or iron. (H13, Fe, Cu)

36-H. Powder Helical Gears: They Said It Couldn't Be Done. Andrew J. Wayson. *Iron Age,* v. 165, Apr. 20, 1950, p. 93-94.

Production of gears. Majority are iron or iron alloy, but some have been made of brass and bronze. Advantages and applications to small equipment. (H14, T7, Fe, Cu)

37-H. Designing Structural Parts for Powder Metallurgy. H. R. Clauser. *Materials & Methods,* v. 31, Apr. 1950, p. 56-59.

Principal design considerations and two case histories to illustrate the advantages of designing specifically for powder metallurgy. (H general)

38-H. Testing Iron Powders and Sintered Iron. (In German.) Rolf Schwalbe. *Stahl und Eisen,* v. 70, Mar. 16, 1950, p. 219-227.

Need for standardization of test methods in powder metallurgy. Methods of determining chemical and physical properties of iron powders and sintered iron compacts. Impact strength of sintered iron compared with that of Armco iron. 34 ref. (H11, Q6, Fe)

39-H. Influence of Active Lubricants on the Pressing and Sintering of Powdered Metals. (In Russian.) V. I. Likhtman and P. A. Rebinder. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Feb. 11, 1950, p. 851-853.

Investigated for Fe, Cu, and Sn, using oleic acid dissolved in vaseline oil or in benzene (5-10 cc. of oleic acid per kg. of powder). (H13, Fe, Cu, Sn)

40-H. Effect of Change of Scale on Sintering Phenomena. Conyers Herring. *Journal of Applied Physics,* v. 21, Apr. 1950, p. 301-303.

When certain plausible assumptions are fulfilled, simple scaling laws govern the times required to produce, by sintering at a given temperature, geometrically similar changes in two or more systems of solid particles which are identical geometrically except for a difference of scale. Suggests that experimental studies of the effect of such a change of scale may prove valuable in identifying the predominant mechanism responsible for sintering under any particular set of conditions, and may also help to decide certain fundamental questions in fields such as creep and crystal growth. (H15)

41-H. Concerning the Uses of Copper Powder. (In German.) W. Katz. *Metall,* v. 4, Mar. 1950, p. 81-85.

Production of various sintered articles of Cu and Cu+Fe powders and their respective properties as compared with those of other materials. Copper wire extruded from sintered copper bars was found to have a higher conductivity than that made from cast copper. Sintered copper filters are superior to ceramic filters in strength and elasticity. Several methods of producing copper powder are outlined in tabular form. 12 ref. (H general, T general, Cu)

42-H. Investigation of Structural-Mechanical Properties of Powder-Metallurgy Products. (In Russian.) *Vestnik Akademii Nauk SSSR* (News of the Academy of Sciences of the USSR), v. 20, Feb. 1950, p. 102-103.

Investigation of the effects of surface-active agents (solutions of oleic acid in vaseline, etc.) on the pressing and sintering of metallic powders (Fe, Cu, and Sn). Data on elastic expansion after removal from the mold, electro-conductivity, and recrystallization temperature indicate that binders improve the mechanical properties of such products. (H14, Fe, Cu, Sn)

43-H. Plastic Bonding of Boron Powder. L. Hays and J. E. Burke. *U. S. Atomic Energy Commission,* AECD-2279, Oct. 4, 1944, 2 pages.

Wet tamping boron powder with methyl methacrylate monomer and polymerizing to produce a finished piece with a boron density of at least 1.6 g. per cc. Almost any shape can be made without constructing dies or using a press. (H14, B)

44-H. Bibliography on Powder Metallurgy With Emphasis on Porous Metals. Fred E. Croxton. *U. S. Atomic Energy Commission,* AECD-2763, Apr. 2, 1948, 26 pages.

Chemical Abstracts 1927-1947, *Engineering Index* 1946, and *Industrial Arts Index,* were searched for references with particular emphasis on pressing and sintering steps. Brief annotations are included. 233 ref. (H general)

45-H. The Applicability of Zirconium Carbide and Thorium Carbide in Sintered Hard-Metal Alloys. R. Kieffer. *Metall,* v. 4, Apr. 1950, p. 132-136.

Method of producing these carbides. Hardness comparisons with cobalt carbide sintered bodies. 20 ref. (H10, C, SG-j)

46-H. Sintering of Metallic Powders. (In Russian.) V. I. Likhtman. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Mar. 11, 1950, p. 323-325.

Mechanism of the process from theoretical and experimental points of view. (H15)

47-H. Powder Parts Invade the Appliance Field. D. W. Lynch and T. J. Snodgrass. *Iron Age,* v. 165, June 8, 1950, p. 83-86.

High strength gears made of copper-impregnated powdered iron, which have replaced malleable iron castings in the gear train of an automatic washer. Savings of 60-70% have been realized. Mechanical properties of various alloys are tabulated and discussed. (H16, T7, Fe)

48-H. Metallurgical Aspects of Presintering and Sintering Cemented Carbides. Geoffrey Edwin Spriggs. *Journal of the Birmingham Metallurgical Society,* v. 30, Mar. 1950, p. 5-25.

In the presintering operation, Cobalt recrystallizes and welding of Co and possibly of carbide particles takes place without the formation of a liquid phase, which gives the compacts enough strength for grinding or machining. In the sintering process, a liquid phase is formed which consists of WC dissolved in Co and produces a considerable amount of contraction filling the voids. On cooling, dissolved WC is re-precipitated and deposited on undissolved grains thus causing grain growth. At room temperature the amount of carbide left in solid solution is less than 1% so the matrix is quite ductile consisting of nearly pure Co. The final product is extremely dense and hard. 13 ref. (H15, Co, W, C)

49-H. Preparation of Metal Carbides. Part I. G. F. Hüttig, V. Fattinger, and K. Kohla. *Powder Metallurgy Bulletin,* v. 5, May 1950, p. 30-37.

Effect of gas atmospheres on the formation of carbides, particularly W and Mo carbides. (To be continued.) (H10, W, Mo, C)

50-H. Precision Stainless Parts by Powder Metallurgy. A. J. Langhammer and Phillip Glick. *Iron Age,* v. 165, June 22, 1950, p. 93-94.

Manufacture of some stainless-steel precision parts through powder metallurgy is said to save some 75% of production cost over standard machining methods. Good stainless powder is key to successful fabrication of machine parts, filters, and bearings. Various examples. (H general, T7, SS)

51-H. The Densification of Pre-Reduced Copper Powder Compacts in Vacuum and in Hydrogen. Charles B. Jordan and Pol Duwez. *Journal of Metals,* v. 188, July 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 943-944.

A study of the increase in density of copper powder compacts as a function of the time and temperature of sintering has been previously reported. The present note describes results of a series of experiments under similar conditions except that the Cu powder was reduced for several hours in hydrogen at 500 or 600° F. before pressing. (H15, Cu)

52-H. Remarks on Mizushima's Method for the Determination of Surface Area of Powders. Ying Fu. *Journal of Chemical Physics,* v. 18, June 1950, p. 899-900.

Shows incorrectness of Mizushima's equations. (H11)

53-H. The Effect of Foreign Gases on the Grain Boundaries of Copper Powder During and After Sintering. (In German.) Horst Schreiner. *Zeitschrift für anorganische Chemie,* v. 262, May 1950, p. 113-121.

The amount of methanol vapor absorbed by electrolytic copper powder sintered in vacuum or in a hydrogen or nitrogen atmosphere was determined. Effects on the sintering process. (H15, Cu)

54-H. Contribution to the Theory of the Powder-Metallurgical Infiltration Process. (In German.) Paul Schwartzkopf. *Zeitschrift für anorganische Chemie,* v. 262, May 1950, p. 218-222.

Process is explained and schematically illustrated. Structure of a piece of spongy sintered Fe infiltrated with Cu. (H16)

55-H. Hardness Measurements on Metallic Sintered Bodies. (In German.) Karl Adlassnig. *Zeitschrift für anorganische Chemie,* v. 262, May 1950, p. 248-257.

Hardnesses of copper bodies sintered for various temperatures and times were determined by the Vickers, Brinell, Rockwell, and scleroscope methods and the results compared with each other as well as

with their other properties. Effects of structure on properties. 10 ref. (H15, Q29, Cu)

56-H. Production of Fine Metal Powders by Hydrogen Reduction. (In Czech.) Miroslav Petrdlik. *Hutnické Listy,* v. 5, Mar. 1950, p. 105-111.

Conditions for complete reduction by hydrogen of the oxides of W, Mo, Fe, Ni, Co, Cu and Pb. By this method finely-grained metal powders are obtained. The reduction is carried out in an electric tube furnace with two temperature zones. The material being reduced flows continuously through the furnace in the opposite direction to the hydrogen. Also presents a method of calculating water-vapor concentration in the reducing atmosphere from conditions in the furnace, and a calculation of composition of the reduction products of various degrees of oxidation based on oxidation number.
(H10, Mo, Fe, Ni, Co, Cu, Pb, W)

57-H. Pressing and Sintering of Metallic and Nonmetallic Powders. (In Polish.) W. Rutkowski and H. Rutkowska. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 1, no. 2, 1949, p. 111-125.

Fe, Cu, Fe-Cu, Cu-Mn, Fe-Mn, and Fe-Cu-Mn powders of electrolytic origin were pressed and sintered. Grain size and grain-size distribution, apparent and true density. Behavior on mixing and compacting with other metallic or nonmetallic powders. 14 ref.
(H14, H15, Fe, Cu, Mn)

58-H. Sintered Porous Graphite-Bronze Bearings. (In Polish.) A. Krupkowski, and W. Cegielski. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 1, no. 2, 1949, p. 163-179.

A method of making porous bearings by sintering metallic powders. Preparation and mixing of powders, pressing and heat treating, oil impregnation, machining, and assembly of sintered bushings. Tests show how various physical and mechanical properties of graphite bronzes depend upon production factors and graphite and tin content. 15 ref. (H general, P general, Q general, T7, Cu)

59-H. Powder Metallurgy; A Mid-Century Review and Preview. Paul Schwarzkopf. *Mechanical Engineering,* v. 72, July 1950, p. 543-548.

Application in high-melting refractory metals; development of cemented carbides; theoretical considerations; the practical approach; intermetallic compounds; development of ferrite materials; manufacturing composite contact materials by infiltration; powder metallurgy in competition with other processes; and mechanism of infiltration process. (H general)

60-H. Ceramics—Silicon Ceramics—Metal Ceramics. (In German.) Max Hauser. *Sprechsaal für Keramik; Glas; Email,* v. 83, Feb. 5, 1950, p. 41-47.

The physicochemical differences between clays, silicon, and other metals as ceramic materials. Shows that the expansion coefficient, thermal conductivity, and corrosion resistance of silicon makes it, for certain purposes, an especially desirable ceramic material. Powder metallurgy is considered a ceramic process and the possibility of using mixtures of clays with powdered metals or ores is discussed. 18 ref. (H general, Si)

61-H. Determining the Compacting Behavior of Iron Powders by Means of a Bending Test. (In German.) Hans Bernstorff and Friedel Moser. *Stahl und Eisen,* v. 70, May 11, 1950, p. 416-420.

Effect of preliminary annealing and processing of iron powders on their pressing and sintering properties, effect of graphite in Fe-graphite mixtures, and behavior of Fe powders produced by different methods. The bending test was found to be sensitive to any variations in materials or methods of sintering. (H14, H15, Fe)

62-H. (Book) **Metallkeramik** (Production of Metal Bodies From Metal Powders, Science and Technique of Sintered Metals, and Metal Powders), Ed. 4. Franz Skaupy. Verlag Chemie, Weinheim-Bergstrasse, Germany. 19 DM.

Exhaustive introduction and two main parts—general and special. First part: Techniques of preparation of metal powders, methods for their investigation and special properties. Methods of cold and hot pressing and subsequent sintering. Internal processes and reactions between powder particles. Second part: The highly refractory pure metals, their carbides and similar compounds; role of the binder; manifold uses of hard metals. Includes the new metal-ceramic compounds and a patent register.
(H general, EG-d)

63-H. New Type of Stainless Steel Powder Develops High Green Strength. George Stern. *Materials & Methods,* v. 32, July 1950, p. 52-54.

Two grades of stainless powder made by a new method. Grade 140 is

essentially 14% Cr, balance Fe; Grade 188 17-18% Cr, 8-9% Ni. These powders have good green strength and moldability. Physical and mechanical properties of the powders, the compacts, and the sintered bodies. Micrographs show stainless-steel powder infiltrated with Cu and Ag. (H11, SS)

64-H. Iron Powder as Raw Material. (In German.) C. P. Debuch. *Umschau,* v. 50, July 1, 1950, p. 411-414.

Production of iron powder, its properties, pressing, and sintering into finished articles and machine parts. (H general, Fe)

65-H. Iron Powder Developed. *Steel,* v. 127, Sept. 4, 1950, p. 58.

New type being produced by Powdered Iron Corp., Detroit, on a pilot-plant scale. The powder resembles Swedish sponge iron physically, but has the purity of the best electrolytic iron powder. Process and advantages. (H10, Fe)

66-H. Designing Dies for Powdered-Metal Parts. E. Mosthaf. *Machinery* (London), v. 77, Aug. 24, 1950, p. 227-233.

Recommendations clarified by diagrams. Selection of punch and die materials. (H14, T5)

67-H. The Mechanism of Sintering. J. P. Roberts. *Metallurgia,* v. 42, Aug. 1950, p. 123-130.

Present knowledge is reviewed. Evaporation-condensation, surface diffusion, volume diffusion, viscous flow, and plastic flow. 36 ref. (H15, B16)

68-H. A New Electrolytic Iron Powder. *Materials & Methods,* v. 23, Sept. 1950, p. 136, 138, 140.

New type of powder now being produced on a pilot-plant scale for industry resembles Swedish sponge iron physically, but has the purity of the best electrolytic iron powder. (H10, Fe)

69-H. Production of Metal Powders; Electrolytic Deposition From Aqueous Solutions. E. Mehl. *Metal Treatment and Drop Forging,* v. 17, Summer 1950, p. 118-122, 124, 126, 128.

Devoted principally to Cu and Fe, with additional references to Zn, Ni, Sn, and Pb. 36 ref. (H10)

70-H. The Formation of Structures During Sintering and Its Effect on the Final Result and on the Sintering Time, Especially for Metal Powders. (In German.) Fr. Skaupy. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 54, July 1950, p. 329-330.

Three general types of structure—the porous structure, the structure whose interstices are filled with a more or less loose substance, and the structure whose interstices are densely packed with another metal, usually of lower melting point. Effects of time, temperature, and heating rate. (H15)

71-H. Contribution to Knowledge Concerning the Electrodeposition of Metal Powders; Effect of Mechanical Obstructions in the Immediate Vicinity of the Cathode. (In German.) N. Ibl and G. Trümpler. *Helvetica Chimica Acta,* v. 33, Aug. 1, 1950, p. 1370-1378.

Deposition of Cu from $CuSO_4$ solutions in the presence of mechanical obstructions (especially $BaSO_4$ suspensions) near the cathode was investigated. As a result, a powder deposit was obtained at only 1% of the current density usually required under otherwise similar conditions. This is explained by the great reduction of cupric ions on the cathode surface caused by the almost complete suppression of normal convection flow within the solution. 14 ref. (H10, Cu)

72-H. Powder Metallurgy in 1949. (In German.) F. Benesovsky. *Metall,* v. 4, Aug. 1950, p. 332-336.

A review. 107 ref. (H general)

73-H. Powder Metallurgy Applications Extended. B. T. Du Pont. *Production Engineering & Management,* v. 26, Oct. 1950, p. 69-70.

Recent advances by means of which parts having physical properties formerly considered outside the limits of compacting and sintering can now be economically made. (H general)

74-H. The Powder Metallurgy of Beryllium. Henry H. Hausner and Norman P. Pinto. *American Society for Metals,* Preprint No. 38, 1950, 18 pages.

Methods were developed for pressing and sintering Be powder, and physical properties of the compacts were determined. Behavior under thermal and mechanical treatments and resultant properties. Fundamental ductility of Be. Method for metallographic polishing of sintered bars. 16 ref.
(H14, H15, Q general, M21, Be)

75-H. Electrodeposition of Copper Powder From Acid Sulfate Baths. D. W. Drumiler, R. W. Moulton, and G. L. Putnam. *Industrial and Engineering Chemistry,* v. 42, Oct. 1950, p. 2099-2102.

Limits of operating variables studied were 26.3-50.3° C.; 34.7-83.5 amp. per sq. ft.; 6.7-38.4 g. of Cu,

as sulfate, per liter; and 9.9-195 g. H_2SO_4 per liter. Apparatus. (L17, Cu)

76-H. Problems in Powder Metallurgy. H. W. Greenwood. *Metallurgia,* v. 42, Sept. 1950, p. 176-178.
A survey. (H general)

77-H. Infiltrated Alloys of Refractory Metals. *Metal Progress,* v. 58, Oct. 1950, p. 534, 536. Condensed from *U. S. Air Force, Air Materiel Command,* Technical Report 5892, A.T.I. 57154, by J. M. Krol and C. G. Goetzel.
Some preliminary experiments on infiltrated tungsten carbide, W-Ti double carbides, titanium carbide and chromium boride as skeletons, and a somewhat more detailed study of the properties of infiltrated Mo, W, and alloys of M and W with each other and with Cr. Both cold and hot pressing were used to produce the skeleton bodies. Oxidation resistance and mechanical strength were measured at 1800° F. and room temperature. (H16, EG-d, C-n)

78-H. Studies on Control of Growth or Shrinkage of Iron-Copper Compacts During Sintering. Jerome F. Kuzmick and Edmund N. Mazza. *Journal of Metals,* v. 188, Oct. 1950, p. 1218-1219.
Experiments were made primarily on Swedish sponge-iron powder produced from magnetite. Specimens contained 1-10% Cu. (H15, Fe)

79-H. Experiments on the Mechanism of Sintering. B. H. Alexander and R. Balluffi. *Journal of Metals,* v. 188, Oct. 1950, p. 1219.
By a method similar to that of Geech & Jones, change in size and shape of interstices between 5-mil Cu wires was followed as a function of time at various sintering temperatures. (H15, Cu)

80-H. Informal Open Discussion of Powder Metallurgy. *Proceedings, Metal Powder Association,* v. 6, 1950, p. 5-24.
Methods of making iron-powder parts and the merits of various powder grades. (H general, Fe)

81-H. Thermochemical Coated Metal Powders. J. E. Drapeau, Jr. *Proceedings, Metal Powder Association,* v. 6, 1950, p. 28-35.
Possibilities of the above. Experiments with cast iron powders. (H12, CI)

82-H. A New Type of Stainless Powder. George Stern. *Proceedings, Metal Powder Association,* v. 6, 1950, p. 49-56; discussion, p. 57-58.
See abstract of "New Type of Stainless Steel Powder Develops High Green Strength," *Materials & Methods,* item 63-H, 1950. (H11, SS)

83-H. Metal Powders in a Competitive Market. John Sasso. *Proceedings, Metal Powder Association,* v. 6, 1950, p. 76-83.
(H general, A4)

84-H. Production of Metal Powders by Electrolysis. (In Portuguese.) Ivo Jordan. *Boletim da Associacao Brasileira de Metais,* v. 6, Apr. 1950, p. 151-178.
The electrolytic process for preparation of metal powders used in powder metallurgy was studied. Methods of preparation (on a laboratory scale) of Cu, Sn, and Zn powders. (H10, Cu, Sn, Zn)

85-H. (Book) Sintereisen: Seine Herstellung nebst gesammelten Erfahrungen. (Sintered Iron: Its Production and Collected Experiences). T. Hoevel. 70 pages. 1948. Friedrich Vieweg & Sohn, Brunswick, Germany. (Werkstattbücher No. 94). 4.50 DM.
Manufacturing processes for sintered-iron products, based on experiences of the A.G. für Bergbau & Hüttenbedarf, Salzgitter. No previous knowledge about pulverizing and sintering is assumed. Production processes are described comprehensively; short notes on machining and applications. (H general, Fe)

86-H. (Book) Proceedings Sixth Annual Meeting, Metal Powder Association, v. 6, 1950. 92 pages. Metal Powder Association, 420 Lexington Ave., New York 17, N. Y. $2.50.
All of the formal papers presented at the meeting, plus discussion and transcript of an informal discussion meeting. Individual papers are abstracted separately. (H general)

87-H. (Book) Treatise on Powder Metallurgy. Vol. II. Applied and Physical Powder Metallurgy. Claus G. Goetzel. 910 pages. 1950. Interscience Publishers, 250 Fifth Ave., New York 1, N. Y. $18.00
In two parts. Part One: Manufacture, properties, and applications of industrial materials and products. Part Two: Practical evaluations and theoretical analyses of materials, products, and processes. Points out controversial aspects of different theories. (H general)

88-H. Sintering Mechanism Between Zirconium Carbide and Columbium. H. J. Hamjian and W. G. Lidman. *National Advisory Committee for Aeronautics,* Technical Note 2198, Oct. 1950, 29 pages.
A ZrC-Cb ceramal containing 12.5% Cb was investigated. Specimens were prepared by hot-pressing and effects of sintering temperature and time at temperature were investigated. A bonding study was made of a hot-pressed ZrC specimen and Cb powder. (H15, C-n Zr, Cb)

89-H. The Powder Metallurgy of Beryllium. H. H. Hausner and N. P. Pinto. *U. S. Atomic Energy Commission,* AECD-2869, Mar. 24, 1949, 64 pages.

See abstract of *American Society for Metals,* Preprint No. 38, 1950, item 74-H. (H14, H15, Be)

90-H. Production of the Heavy Metals by Electrolysis of Molten Salts. IV. Melt Electrolysis in the $FeCl_3$-NaCl System. (In German.) M. Clasing and F. Sauerwald. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 54, Aug. 1950, p. 358-361.

The production of powdered iron from the eutectic $FeCl_3$-NaCl solution with a rotating cathode. Effects of temperature, current density, rate of rotation, etc. (H10, Fe)

91-H. Considerations in Designing Tools for Powder Metallurgy. Irving J. Donahue. *Mechanical Engineering,* v. 72, Nov. 1950, p. 886-889.

Designs of tools for pressing powdered metal parts. (H14)

92-H. Fundamental Concepts in Sintering and Properties of Cermets of the Oxide Metal Type. T. S. Shevlin and G. A. Bole. *Engineering Experiment Station News* (Ohio State University), v. 22, Oct. 1950, p. 22, 41-46.

Experiments with magnesia, nickel, and cobalt, in which the surface-oxidized molten metals wet the magnesia tile and the unoxidized metals do not, corroborate previous work on the development of wetting and bonding between metals and ceramic oxides. The theory of wetting ceramic oxides by metals through a mechanism involving the metal oxide was successfully applied to certain cermet compositions. However, properties of cermets are often not linear functions of composition. (H15, Ni, Co)

93-H. Electrodeposition of Metal Powders. Gustaf Wranglen. *Journal of the Electrochemical Society,* v. 97, Nov. 1950, p. 353-360.

Metal powders may be produced electrolytically by direct deposition on the cathode and grinding of a brittle deposit. Principles underlying the method. Three factors are shown to be responsible for formation of powdery or spongy deposits: low metal overvoltage, depletion of the metal content of the cathode film, and hydroxide formation in the cathode film. Powder formation on the cathode in the electrolysis of Cu, Fe, Ni, Zn, and Cd is analyzed. 20 ref. (H10, Cu, Fe, Ni, Zn, Cd)

94-H. Infiltrated or Impregnated Alloys. H. W. Greenwood. *Engineer,* v. 190, Oct. 20, 1950, p. 384-385.

The filling of pores of a sintered or unsintered compact with a metal or alloy of lower melting point by capillary action; usually by immersion in a bath of liquid metal. (H16)

95-H. The Sintering of Aluminum Alloys. (In German.) A. von Zeerleder. *Zeitschrift für Metallkunde,* v. 41, Aug. 1950, p. 228-231.

The sintering of commercially pure Al powder. The sintered metal was found to have excellent mechanical properties. Comparative properties of this material, pure Al, and two Al alloys. (H15, Al)

96-H. Processes Occurring During the Sintering of Hard-Metal Alloys. (In German.) Walther Dawihl and Karl Schröter. *Zeitschrift für Metallkunde,* v. 41, Aug. 1950, p. 231-233.

Literature review shows that the fact that Co promotes the sintering of tungsten alloys is due to the ability of Co to dissolve solid and liquid WC. 13 ref. (H15, C-n, W)

97-H. Powdered Iron Blades for Gas Turbines. Joseph Geschelin. *Automotive Industries,* v. 103, Nov. 15, 1950, p. 40-41, 58.

Production methods by Thompson Products, Inc. After coining, the blades are subjected to infiltration with a Cu alloy. Straightening, degreasing, heat treatment, grinding, electroplating with Cu-Ni-Cr alloy, and inspection are other steps in production of finished blades. (H16, T25, Fe, Cu)

98-H. Powder Metallurgy. Paul Schwarzkopf. *Journal of the American Society of Naval Engineers,* v. 62, Nov. 1950, p. 909-919.

Reprinted from *Mechanical Engineering.* See item 59-H, 1950. (H general)

99-H. Beryllium Powder Compacts Reduced 9% by Cold Rolling. *Steel,* v. 127, Dec. 11, 1950, p. 93. Based on "The Powder Metallurgy of Beryllium", Henry H. Hausner and Norman P. Pinto.

Previously abstracted from *American Society for Metals,* Preprint 38, 1950. See item 74-H, 1950. (H14, H15, Be)

100-H. On the Pressing of Nickel Powder. H. Lipson. *Powder Metallurgy Bulletin,* v. 5, Sept. 1950, p. 52-57.

Pressing moduli of different sizes of Ni-powder were determined for single and double-action dies. The moduli do not vary appreciably with particle size except when there is a marked difference in apparent density for a certain size of powder. (H14, H11, Ni)

101-H. Application of Dilatometry to Powder Metallurgy. J. H. Andrew and G. S. Tendolkar. *Journal of Scientific & Industrial Research,* v. 9B, Oct. 1950, p. 244-247.

Modified horizontal dilatometer designed and used to study volume changes of pressed Cu-powder specimens during heating. Characteristics of the curves showing the relationship between linear expansion and temperature vary with particle size and compacting pressure. (H14, Cu)

102-H. Powder Metallurgy Studies, I-II. (In German.) J. Heuberger. *Acta Polytechnica* (Chemistry Including Metallurgy Series), v. 2, no. 3, 1950, 20 pages.

Part I: Sintering behavior of copper graphite powder compacts. Variation of apparent density and hardness of 90% Cu and 10% graphite was studied at sintering temperature. Compacts were produced by pressure of 270 to 2660 kg. per sq. cm., and investigated from 450 to 800° C. Part II: Compactability of iron powder. On the basis of assumptions founded on practical experience a logarithmic equation is deduced for the connection between specific pressure and apparent density of iron-powder compacts, which seems to be satisfactory for a number of these compacts investigated within a large pressure range. (H11, H14, H15, Cu, Fe)

103-H. Effect of Plasticity of the Metal Particles on the Sintering of Metal Powders. (In German.) Franz Skaupy. *Zeitschrift für Metallkunde,* v. 41, Sept. 1950, p. 301-303.

Various theories compared with the results obtained during the sintering of high-melting oxides. 15 ref. (H15)

104-H. Rolling of Strips From Iron Powder. (In German.) Gerhard Naeser and Franz Zirm. *Stahl und Eisen,* v. 70, Oct. 26, 1950, p. 995-1004.

Conditions required to roll continuous strips of sheet metal from iron and other metal powders. Effects of production conditions (density of the rolled metal, grain size of the powder, sintering time and temperature, etc.) on tensile strength of the rolled strip. 29 ref. (H14, Fe)

105-H. Twenty-One Years of Powder Metallurgy. H. W. Greenwood. *Metallurgia,* v. 42, Nov. 1950, p. 336-338.

A review. 14 ref. (H general)

106-H. Relationship of Coercive Force of Powders of Highly-Coercive Alloys on Particle Size. (In Russian.) T. D. Zotov and Ya. S. Shur. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Oct. 1, 1950, p. 687-689.

Studied for "Alni" alloy (25% Ni, 14% Al, rest Fe) differently produced and heat treated. Results indicate that this relationship is strongly influenced by method of production of the powders and by the conditions of heat treatment. (H11, Fe)

SECTION J

HEAT TREATMENT

1J. Operating Costs Cut and Efficiency Improved by Normalizing Procedure Used in the Manufacture of High-Pressure Gas Cylinders. L. E. Browne. *Steel,* v. 125, Dec. 26, 1949, p. 53-54.

Equipment and procedure of Taylor-Wharton Iron & Steel Co. A special design of furnace with rapid heating and close temperature control is used. (J24)

2J. Development of Furnaces for Malleable Iron Annealing. C. H. Martin. *Foundry,* v. 78, Jan. 1950, p. 80-83, 209-213.

Factors which have permitted more efficient and more rapid annealing. Operation of typical equipment. (J23, CI)

3J. Practical Heat Treatment of Tool Steels. H. B. Chambers. *Canadian Metals and Metallurgical Industries,* v. 12, Dec. 1949, p. 8-11, 36.

Elements of good hardening technique, with special attention to temperature ranges. (J26, TS)

4J. Some Aspects of Salt Bath Furnaces Discussed in Their Application to the Wire Industry. Part Three. (Concluded.) B. M. Pearson. *Wire Industry,* v. 16, Dec. 1949, p. 973-975.

Spheroidizing heat treatment; salt baths for patenting; German practice; metallurgy of patenting; salt-bath installations and operating results; annealing; processing nonferrous metals; and operating costs. (J2, J25)

5J. Effect of Homogenising on the Structure and Properties of an Extruded Al-Cu-Mg Alloy. H. A. Unckel. *Metallurgia,* v. 41, Nov. 1949, p. 26-29.

Experimental investigation showing that the transverse tensile properties of extruded Al alloys of the duralumin type are lowered by the presence of strings of inclusions of intermetallic compounds. Effect of a homogenizing treatment before and after extrusion was determined. (J21, Q27, Al)

6J. Induction Heating: Modern Applications in the Non-Ferrous Metal Industry. *Metal Industry,* v. 75, Dec. 9, 1949, p. 498-501.

Applications to brazing, soldering, annealing, and forming. Choice of frequency. (J2, K7, K8)

7J. Heat Treating. *Steel,* v. 126, Jan. 2, 1950, p. 200-202.

Brief reviews and forecasts: Heat Treating Trend Toward Versatility, Howard E. Boyer. Heat Treating Accuracy Matches Precision Machining, Orlo E. Brown, Jr. Induction Heating Rounds to Production Line Manufacture, Frank W. Curtis. More Efficient Radiant Tubes Cut Fuel Costs, J. L. Whitten. New Billet Furnaces Widen Concepts of Metal Heating, E. G. de Coriolis. Heat Processing of Metals May Be Boon to Industry, Frederic O. Hess. Electric Furnaces Used in Variety of Applications, R. M. Cherry. Salt Bath Heat Treating Makes Great Strides, William Adam, Jr. Blended Engineering Skills Improve Furnace Designs, W. H. Holcroft. Flame Hardening Profitable "Tool" for Auto Industry, H. V. Inskeep. (J general)

8J. Articulation of Alloy Steel Fixtures to Withstand Quenching Stresses. II. George C. McCormick. *Industrial Heating,* v. 16, Dec. 1949, p. 2140, 2142, 2144, 2146.

Composite units, articulation in baskets, the quench system and alloy life, alloys for quenching, and the importance of design. (Concluded.) (J26, T5, AY)

9J. Electronic Selective Hardening Affords Flexibility, Speed, Cleanliness and Economy. A. H. Allen. *Steel,* v. 126, Jan. 9, 1950, p. 46-47, 64.

Methods and equipment for hardening a large variety of small steel parts. (J2, ST)

10J. Controlled Atmospheres for Forgings and Tool Steels. Part II. Lester F. Spencer. *Steel Processing,* v. 35, Dec. 1949, p. 649-654, 658-659, 666, 669.

Effects of individual gases composing the five main types of prepared atmospheres. Methods for evaluation of suitability of an atmosphere on the basis of tests on the product metal. Typical results with respect to metallographic structure and hardness. The change-of-weight test. (J2).

11J. Performance of Radiant Tube Furnaces. Ellis A. Dooe. *Steel Processing,* v. 35, Dec. 1949, p. 655-656.

Experiences of Detroit Steel Products Co., in use of the above furnaces for heat treating various steels over the past 15 years. (J general, ST)

12J. Quench Cracking Factors. D. W. McDowell, Jr. *Iron Age,* v. 165, Jan. 12, 1950, p. 64-67.

Quench cracking in light and heavy-walled low-alloy gun steel. It was found that a definite correlation exists between quench cracking and such variables as carbon content, pouring temperature, ingot size and forging reduction, method of quenching, and finishing temperatures. (J26, AY)

13J. Some Economic Aspects of Radio-Frequency Heating. Lawrence M. Duryee. *Transactions of the American Institute of Electrical Engineers,* v. 67, Part I, 1948, p. 105-112.

Previously abstracted from condensed version in *Engineering.* See item 12a-79, 1948. (J2)

14J. Mercury-Arc Frequency Converter for Induction Heating of Metals. S. R. Durand and J. B. Rice. *Transactions of the American Institute of Electrical Engineers,* v. 67, Part II, 1948, p. 1592-1599.

Theory of operation for converting 3-phase power of commercial system frequencies into single-phase power of 1 kc. 12 ref. (J2)

15J. Protective Atmosphere Annealing of Metals. (In German.) Walter Baukloh. *Metalloberfläche,* v. 3, sec. A, Sept. 1949, p. A165-A170; Nov. 1949, p. A197-A203.

Theory and practice. Part II: Production of the gases, construction of the furnaces used, and the different annealing methods. (J23, J2)

16J. Status of the Induction Hardening of Gear Wheels. Strength and Wear Properties. (In German.) M. Ulrich and H. Glaubitz. *Zeitschrift des vereines Deutscher Ingenieure,* v. 91, Nov. 15, 1949, p. 577-583.

Principles and advantages of the method. The physical properties of induction-hardened wheels compare favorably with those of wheels hardened in the cyanide bath. (J2)

17J. Strength and Wear Properties of Flame-Hardened Gear Wheels. (In German.) M. Ulrich and H. Glaubitz. *Zeitschrift des vereines Deutscher Ingenieure,* v. 91, Nov. 15, 1949, p. 584-587.

Effect of core hardness and depth of the hardened surface on strength properties of gear teeth. Flame hardening is superior to case hardening, and the progressive spinning method of flame hardening is considerably superior to the spot hardening process. (J2)

18J. Fuel-Fired and Electric Furnaces in the Aluminum Industry. Part II. Heating and Heat-Treating Furnaces. (In Italian.) L. Bemporad. *Alluminio,* v. 18, July-Aug. 1949, p. 378-394.

Various types, especially those used for treating of aluminum and its alloys. Operating data. (J general, Al)

19J. Diagram for Determination of Annealability of Steel on the Basis of Critical Rate of Quenching. (In Russian.) I. F. Afonskii. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Sept. 1949, p. 1074-1077.

Diagram is constructed on the basis of existing data, correlating factors involved. It permits rapid determination of rate of cooling of the center of an object of any cross section, quenched in any medium. (J26, ST)

20J. Method of Determination of Critical Rate of Quenching. (In Russian.) M. E. Blanter. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Sept. 1949, p. 1077-1079.

Simple method for experimental determination of the minimum rate of cooling necessary to obtain the martensite structure. Data indicate existence of a regular relationship between distance to the martensite zone and distance to the semi-martensite zone, from the end of the test bar. Influence of alloying elements on "critical rate of quenching" of different steels. (J26, ST)

21J. Evaluation of Deformability of Steel During Heat Treatment. (In Russian.) R. I. Mochalkin. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Oct. 1949, p. 1229-1232.

Simple method and typical data. (J general, ST)

22J. Induction Hardening of Gears. Gear Tests and Performance. (Excerpts from paper by H. B. Knowlton.) **Induction-Hardening Equipment.** (Excerpts from paper by H. F. Kincaid.) **Induction-Hardening Processes.** (Excerpts from paper by John A. Redmond.) *SAE Journal,* v. 58, Jan. 1950, p. 54-62. (To be printed in full in *SAE Quarterly Transactions.*)

Engineering and production advantages over carburizing. Knowlton uses engineering test and service performance data to explain the difference in load-carrying capacity between induction-hardened and carburized gears. Type of equipment and methods used by International Harvester are described by Kincaid. Redmond gives power requirements of the process and shows effect of difference in heating values. (J2, T7)

23J. Heating and Quenching Time Cut by New Machine for Flame Hardening Gears, Cams and Wheels. *Steel,* v. 126, Jan. 16, 1950, p. 84.

Machine, called the Lakeside radial rotary flame hardener, consists of a series of burners directed on the piece, which is mounted in a motor-driven spindle. Work spins at a determined rate of speed as it heats. As soon as the proper temperature is reached, a hydraulic mechanism quenches the work. (J2, T7)

24J. Heat Treatment of Chromium Plate. Allen G. Gray. *Products Finishing,* v. 14, Jan. 1950, p. 50, 52, 54, 56, 58, 60.

Reviews paper by Cloyd A. Snavely and Charles L. Faust of Battelle Memorial Institute on the structure of hard chromium plate, which brought out experimental data showing changes that take place in chromium plate as a result of annealing. Effect of base metal, of hydrogen, and of vacuum heat treatment. (J23, L17, Cr)

25J. Advanced Induction Heat Treat Tooling and Methods at Studebaker. William J. Harris. *Production Engineering & Management,* v. 25, Jan. 1950, p. 68-69. (J2)

26J. Annealing of Whiteheart Malleable Castings; Some Aspects of the Gaseous Process. Fritz Schulte. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Dec. 1949, p. 177-199.

Economic importance of the gaseous annealing process and metallurgical advantages. The special properties of various atmospheres and advantages of gas mixtures obtained by reaction with steam or mixtures of air and steam. A new method enables gas composition to be regulated without use of gas-analysis control instruments. 13 ref. (J23, CI)

27J. Casehardening of Lathe Ways by Induction Heating Using High-Frequency Currents. (In Russian.) E. D. Spivac and E. S. Kagan. *Stanki i Instrument* (Machine Tools and Equipment), v. 20, Sept. 1949, p. 5-8.

Newly designed equipment of modified cast iron or ordinary gray iron. Structural features and optimum conditions of operation for different types of cast iron. (J2, T5, CI)

28J. Deep Carburization in a Liquid Bath. (In Russian.) E. M. Morozova and F. R. Florensova. *Stanki i Instrument* (Machine Tools and Equipment), v. 20, Sept. 1949, p. 17-18.

Salt-bath treatment of carbon steel, several bath compositions at 850-900° C. Use of NH_4Cl as activator in baths containing carborundum as the source of carbon, thus eliminating the necessity for cyanide salts and decreasing the cost of the process, while still obtaining a carburized layer 1.5-2.0 mm. deep. (J2, CN)

29-J. Continuous Induction Hardening of Cold Finished Steel Bars. J. J. Day, Jr. *Metal Progress,* v. 57, Jan. 1950, p. 69-72.

Full cross-sectional hardening of bar stock—that is, hardening as deeply as the hardenability of the steel will permit. Soft centers can be produced by suitable control of the power input and rate of travel of the bar. Continuous induction hardening compared with conventional heating and water quenching. (J2, CN)

30-J. A Modern Flash-Annealing Furnace: Details of a New Plant Design. *Sheet Metal Industries,* v. 27, Jan. 1950, p. 19-20.

British installation. (J23)

31-J. Induction-Hardened Gears. Part I. Equipment and Methods. H. F. Kincaid. **Part II. Engineering Tests and Service Performance.** H. B. Knowlton. *SAE Quarterly Transactions,* v. 4, Jan. 1950, p. 116-131; discussion, p. 131-134.

Previously abstracted from condensed version in *SAE Journal.* See item 22-J, 1950. (J2, T7)

32-J. High-Frequency Heat-Treatment of Gears—Equipment and Processes. John A. Redmond. *SAE Quarterly Transactions,* v. 4, Jan. 1950, p.

135-146; discussion, p. 146.

Previously abstracted from condensed version in *SAE Journal*. See item 22-J, 1950. (J2, T7)

33-J. Dual-Purpose Salt Bath Cuts Steel Processing Costs. C. M. Campbell. *Materials & Methods*, v. 31, Jan. 1950, p. 62-63.

Descaling and tempering steps are combined to prepare automotive forgings for finishing without sacrifice of quality. (J2, CN)

34-J. Problems and Remedies in Heat Treating Stainless Steels. *Materials & Methods*, v. 31, Jan. 1940, p. 81.

A tabular presentation.
(J general, SS)

35-J. Hardening, Quenching, and Tempering in the Helical Spring Production Line. P. E. Eckberg. *Industrial Gas*, v. 28, Jan. 1950, p. 3-5.

Equipment. (J general, CN, AY)

36-J. Heat Treating Non-Ferrous Metals and Alloys. J. W. Meier. *Canadian Metals*, v. 13, Jan. 1950, p. 12-16.

Methods are outlined in relation to the metallurgical properties required. 16 ref. (J general)

37-J. Discussion on "The Design and Operation of Annealing Plant for Mild-Steel Sheets and Coils". *Journal of the Iron and Steel Institute*, v. 164, Jan. 1950, p. 87-90.

Refers to paper by R. D. Pollard in May 1949 issue. See item 18B-91, 1949. (J23, CN)

38-J. Salt Baths for Annealing and Descaling. Ernest Hague. *Metallurgia*, v. 41, Dec. 1949, p. 63-67.

Advantages associated with salt-bath heating. (J2)

39-J. Mass Production of "Raydex" Hardened Plow Shares. *Industrial Heating*, v. 17, Jan. 1950, p. 26, 28, 30, 32-34, 36, 38, 182, 184, 186.

Automatic continuous heat treatment equipment for hardening unique three-piece plowshares made from SAE 1095 bar steel. (J26, CN)

40-J. Scale Reduction in Controlled Atmosphere Cycle Annealing. C. A. Payntor. *Industrial Heating*, v. 17, Jan. 1950, p. 42-44, 46, 48-49, 169-170.

Previously abstracted from *Iron Age*. See item 18B-235, 1949. (J23, ST)

41-J. Effect of Annealing in a Magnetic Field Upon Iron-Cobalt and Iron-Cobalt-Nickel Alloys Prepared by Powder Metallurgy. Joseph F. Libsch, Eberhard Both, George W. Beckman, Donald Warren, and Robert J. Franklin. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 188, Feb. 1950, p. 287-296.

The 50% Fe-Co alloy exhibits optimum magnetic properties and an essentially rectangular hysteresis loop when subjected to the best magnetic annealing cycle developed. Small amounts of Ni appear to be detrimental in the alloys studied. 27 ref. (J23, P16, SG-n)

42-J. Heat Treating in the Field. James Kneiper. *Industry & Welding*, v. 23, Feb. 1950, p. 16-18, 42, 44, 46.

Procedures for welding and stress-relief heat treatment of the welds in large refinery equipment and the like. Elements for resistance preheating and stress relief. Use of the induction method on pipes up to 36 in. diam. (J1, K general)

43-J. Implications in High Speed Heating for the Steel Industry. Frederic O. Hess. *Iron and Steel Engineer*, v. 27, Jan. 1950, p. 63-73; discussion, p. 73.

High-speed heating techniques utilizing gas as fuel; heating rates of 1-5 min. per in. of thickness are in contrast to conventional practice of ½-1 hr. per in. of thickness. Procedures and equipment. Comparative structural characteristics of steels annealed by high-speed and conventional methods. (J23, ST)

44-J. Heating by High-Frequency Fields. I. Induction Heating. E. C. Witsenburg. *Philips Technical Review*, v. 11, Dec. 1949, p. 165-175.

Fundamental principles, practical equipment, and procedures; and applications in metallurgy—surface hardening, annealing, brazing and soldering, and melting. A formula is derived for determining the efficiency of the work coil through which the current passes that induces the heating current in the workpieces. (J2)

45-J. Heat Treating Trends and Developments for 1949. Howard E. Boyer. *Steel Processing*, v. 36, Jan. 1950, p. 15-21, 44-45.

New developments in equipment.
(J general)

46-J. Wild-Barfield Forced Air Circulation Furnaces for Heat Treating Light Alloys. *Machinery* (London), v. 76, Jan. 12, 1950, p. 55-56.
(J general, Al)

47-J. Some Effects of Quenching and Tempering on Residual Stresses in Steel. A. L. Boegehold. *Metal Progress*, v. 57, Feb. 1950, p. 183-188.

Experimental data for cylindrical specimens of a variety of carbon, alloy, and toolsteels. It is concluded that unfavorable residual stress may be present after tempering and should be determined experimentally to be

sure that the steel is being used to best advantage. (J26, J29, Q25, ST)

48-J. Some Experiments on Beryllium Steels. Michael G. Corson. *Metal Progress*, v. 57, Feb. 1950, p. 211-212.

Work was done on five series of steels, each containing the same nine C-Be combinations. Hopes concerning resistance to softening during tempering did not materialize. Possibility of discovering unusually good properties seems remote in the Fe-Be-C system. (J29, AY)

49-J. Protective Atmospheres in Industry. Part XIII. A. G. Hotchkiss and H. M. Webber. *General Electric Review*, v. 53, Feb. 1950, p. 43-51.

Methods for heat treating, metals hardening, electric-furnace brazing, powder metallurgy, and gas carburizing in which protective atmospheres are used. (J2)

50-J. Formability of Strong Aluminum Alloys Improved by Re-Solution Treatment. Paul W. Boone. *Materials & Methods*, v. 31, Feb. 1950, p. 60-62.

Method useful when 14S, 24S, and R301 are to be formed which does not lower strength properties when alloys are fully aged after forming. The process consists of heating the alloy at slightly elevated temperatures for a short period and then air cooling to room temperature. (J27, Q23, Al)

51-J. Economical Inert Gases Serve Industry in Many Ways. Edward J. Funk, Jr. *Industrial Heating*, v. 17, Jan. 1950, p. 58-60, 62, 64, 66, 68, 70.

Applications in heat treatment of ferrous and nonferrous metals, in welding, and in fire and explosion protection. Generating equipment is illustrated. (J2, K general)

52-J. New Machines for Flame Hardening. H. V. Inskeep. *Steel Processing*, v. 36, Feb. 1950, p. 91-96.

Details of machines and some typical products. (J2)

53-J. From a Metallurgist's Notebook; Embrittlement of Gold. H. H. Symonds. *Metal Industry*, v. 76, Feb. 3, 1950, p. 91-93.

The importance of correct annealing conditions is stressed in conclusions derived from a thorough metallurgical investigation of the causes of cracking in 9-carat gold watch cases and strip. The alloy contained approximately 44% Cu, 37% Au, 10% Ag, 8% Zn, and 0.014% Bi. (J23, Cu, Au)

54-J. Fundamental Study of Mild Carburization. I. (In Japanese.) Masuo Kawakami and Eisho Fuji. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, May 1949, p. 6-9.

Means of preventing excess carburization of Cr steel, resulting in brittleness, by use of charcoal plus promoters such as $BaCO_3$ or Na_2CO_3. Suppressors are classified into three types—silicate, aluminate, and phosphate. Mechanism of action of the first was investigated. 15 ref. (J28, AY)

55-J. Concerning the Heat Treatment and Magnetic Properties of W-Cr Magnet Steel. (In Japanese.) Sadao Koshiba, Gosaburo Inagaki, and Terumi Nishinuma. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, July 1949, p. 8-11.

Results of experimental investigation. Optimum heat treatment schedules. (J general, P16, SG-n)

56-J. Concerning the Mild Carburization of Chromium Steel. I-IV. (In Japanese.) Hisao Matsumoto. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, July 1949, p. 19-28.

Experimental and theoretical investigation of the use of various carburizers and promoters applied to 1% Cr steel. 26 ref. (J28, AY)

57-J. Carburization of Th-W Filaments. (In Japanese.) Tokuhiko Motida. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, July 1949, p. 31-35.

When the Th-W filaments used in vacuum tubes are heated in a carburizing atmosphere, a layer of W_2C can be formed on their surfaces. This layer increases the thermionic emissivity of the filament. Hence conditions of formation of the layer were studied by microscopic methods. (J28, P17, T1, Th, W)

58-J. Infrared Radiant Heating. Harold J. Garber and F. M. Tiller. *Industrial and Engineering Chemistry*, v. 42, Mar. 1950, p. 456-463.

Use of radiation in heating of materials of low thermal conductivity. Simplified graphical solutions for temperature vs. time at the top, center, and bottom of slabs subjected to radiation. With high radiant intensities, it is possible to heat the surface of a thick material having a low thermal conductivity to a high temperature in a short period of time without greatly elevating subsurface temperatures. (J2)

59-J. Flame Hardening Special Bearings of Unusual Design. J. D. Fitzpatrick. *Western Machinery and Steel World*, v. 41, Feb. 1950, p. 112. (J2, T7)

60-J. Customer's Heat Treating Problems Solved in Hayes Demonstration Laboratory. *Industrial Heating,* v. 17, Feb. 1950, p. 250-252, 254, 256.

A service laboratory. (J general)

61-J. Successful Operation of a Modern Commercial Heat Treating Plant. George H. Porter, III, and E. J. Jeffries. *Industrial Heating,* v. 17, Feb. 1950, p. 316-320, 322, 324, 326, 328.

Equipment and procedures of Geo. H. Porter Steel Treating Co., Cleveland. (J general)

62-J. Flame Hardening Techniques. F. McGuire. *Industry & Welding,* v. 23, Mar. 1950, p. 22-25, 66-67.

(J2)

63-J. Flash Annealing; Continuous Furnace for Aluminium Alloy Sheets and Circles. *Metal Industry,* v. 76, Feb. 10, 1950, p. 110.

(J23, Al)

64-J. Twist Drill Manufacture. *Machinery* (London), v. 76, Feb. 9, 1950, p. 188-191.

Procedures and equipment for hardening and tempering, brazing, and finish grinding. (J26, K8, G18, TS)

65-J. Some Recent Progress in Treatment of Steel Parts. (In French.) J. Pomey, F. Goutel, R. Coudray, and L. Abel. *Revue de Métallurgie,* v. 46, Dec. 1949, p. 825-842.

Reviews recent literature on heat treatment of different types of steel. 24 ref. (J general, ST)

66-J. The Applicability of Isothermal Hardening in the Production of Unalloyed Steel Wires. (In German.) Anton Pomp and Günter Gesche. *Stahl und Eisen,* v. 70, Jan. 19, 1950, p. 52-57.

Three steel wires (0.37, 0.50, and 0.62% C) were isothermally hardened by quenching in salt baths from 925 to 300-450° C. Various mechanical properties of the subsequently drawn wires were determined and compared with those of other wires. 21 ref. (J26, J2, Q general, CN)

67-J. Plant Experiences With Direct Resistance Heating for Patenting of Steel Wires. (In German.) Karl Zankel. *Stahl und Eisen,* v. 70, Jan. 19, 1950, p. 58-62.

Development and operation of steel wire patenting methods and equipment. Ways of eliminating operational difficulties. Advantages over electrically heated muffle furnaces. (J25, CN)

68-J. High-Frequency Heat Treating Parts of Peat-Processing Equipment. (In Russian.) A. V. Bolotina. *Torfnaya Promyshlennost* (Peat Industry), v. 26, Nov. 1949, p. 17-19.

Characteristics of induction furnace used and method of oil or water quenching. Optimum operating conditions for parts of different compositions. (J2, ST)

69-J. The Selection of Furnaces in Heat Treatment. Islay S. Reid. *Canadian Metals,* v. 13, Feb. 1950, p. 31-33, 35, 51.

Discussion clarified by examples. (J general)

70-J. Strain Aging in Welding Structural Steel. *Welding Journal,* v. 29, Mar. 1950, p. 132s-133s.

R. E. Lorentz, Jr., and Wells E. Ellis discuss above paper by W. H. Bruckner and S. W. Sandberg (Sept. 1949 issue). Includes authors' replies. See item 18B-171, 1949. (J1, K9, CN)

71-J. Methods of Measuring Case Depth of Steel. *SAE Journal,* v. 58, Mar. 1950, p. 51-54.

SAE Recommended Practice. (J28, ST)

72-J. Controlled Atmospheres; Principles and Applications in the Ferrous Field. D. M. Dovey and I. Jenkins. *Iron and Steel,* v. 22, Dec. 1949, p. 645-648; v. 23, Jan. 1950, p. 33-36; Feb. 1950, p. 69-72; Mar. 1950, p. 105-107.

Dec. issue: Chemistry of controlled atmosphere processes; gas-steel reactants—the role of nitrogen. Jan. issue: Roles of oxygen, hydrogen, carbon, sulfur, and ammonia. The mixed atmospheres N_2-H_2-H_2O, N_2-CO-CO_2, and N_2-H_2-H_2O-CO-CO_2-C_xH_y. Feb. issue: Atmospheres of controlled and varying oxygen potentials; scrubbing of atmospheres; and some general applications. Mar. issue: Combined carburizing and nitriding treatments, metallizing (chromizing, siliconizing, etc.); possible future developments. (J2, L11, Fe)

73-J. Influence of Some Additions on the Rate of Carburization of Steel by Charcoal. (In Czech.) Josef Doskar. *Hutnické Listy,* v. 4, Nov. 1949, p. 345-351; Dec. 1949, p. 389-391.

Influence of $BaCO_3$, $SrCO_3$, Li_2CO_3, Na_2CO_3, and K_2CO_3 on rate of carburization of steels was investigated at 800° C. Recommended mixtures are described. 10 ref. (J28, ST)

74-J. Flash Annealing Furnace for Light Alloy Sheet. *Light Metals,* v. 13, Mar. 1950, p. 146-147.

(J23, Al)

75-J. Cutting Costs by Improved Heat Treating Methods. E. J. Pavesic. *Iron Age,* v. 165, Mar. 30, 1950, p. 98-100.

Recommended equipment and procedures applicable to tool and die steels. (J general, TS)

76-J. Large Continuous Furnaces for Annealing Brass. *Metal Progress,* v. 57, Mar. 1950, p. 327-331.

Special furnace installations which epitomize fundamental change now going on in the nonferrous industry from hand operation of small units to mechanical handling of large units. Last of three articles on various features of Scovill Mfg. Co.'s new brass mill. (J23, Cu)

77-J. Modern Heat Treating. I. The Salt Bath. II. Traditional Operations. William Adam, Jr., and Leon B. Rosseau. *Metal Progress,* v. 57, Mar. 1950, p. 332-334; Apr. 1950, p. 498-501.

Part I: Advantages and disadvantages. Internal-heating equipment. Part II: "Traditional" operations of annealing, quenching and hardening of steel, using the salt bath. (J2)

78-J. Dry Cyaniding in a Special Gas Furnace. *Industrial Gas,* v. 28, Mar. 1950, p. 7, 26-27.

Installation at Commercial Steel Treating Corp., Detroit. (J28, ST)

79-J. High Production Furnace—Versatile Tool for Controlled Atmosphere Heat Treating. W. A. Lundy. *Industrial Gas,* v. 28, Mar. 1950, p. 12-13, 27-29.

Equipment developed by Surface Combustion Corp. (J2)

80-J. Bright Carbonitriding of Steel Accomplished in Automatic Furnace. H. N. Ipsen. *Materials & Methods,* v. 31, Mar. 1950, p. 61-63.

How combination of protective atmosphere and automatic control of quenching medium insured bright, clean surfaces and uniform case depth, and eliminated distortion of a wide range of parts. (J28, ST)

81-J. Heat Treatment of Gear Steels. *American Machinist,* v. 94, Apr. 3, 1950, p. 167, 169.

Condensed recommendations, including tables. (J general, T7, AY)

82-J. Comprehensive Heat Treating. M. E. Richardson. *Western Machinery and Steel World,* v. 41, Mar. 1950, p. 70-73.

Facilities of Russell, Burdsall & Ward Bolt and Nut Co. Microstructures before and after treating are illustrated. Limited to steels. (J general, ST)

83-J. Special Gas Furnaces Cut Fuel Costs, Improve Dry Cyaniding. *Steel,* v. 126, Apr. 10, 1950, p. 85-86.

Automatic, gas-fired, batch-type units which give one large steel heat treater operating advantages in case hardening a wide variety of steel parts. (J28, ST)

84-J. Composition of Atmospheres Inert to Heated Carbon Steel. R. W. Gurry. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Apr. 1950, p. 671-687.

Series of charts giving compositions of all gas mixtures containing the elements C, H, O, and N, which at 1000–1800° F. are in equilibrium with (1) austenite of various carbon contents, (2) iron and iron carbide, (3) graphite, and (4) iron and its oxide. 11 ref. (J2, Cn)

85-J. Some Notes on the Nitriding of High Speed Steel. J. G. Morrison. *Tool Engineer,* v. 24, Apr. 1950, p. C13-C16.

Procedures, and mechanical properties resulting from various nitriding and stress-relief schedules. (J28, TS)

86-J. Automatic Control Helps To Save the Cost of One Furnace by Increasing Production of Others. M. A. Embertson. *Instruments,* v. 23, Mar. 1950, p. 236-237.

Results achieved through installation of a new patenting furnace for carbon steel wire complete with fully automatic control equipment. (J25, S18, CN)

87-J. Trouble Shooting in Tool Hardening. R. Stewart. *Canadian Metals,* v. 13, Mar. 1950, p. 10-13, 47, 50-51.

Causes and cures of many tool failures; prescribed manufacturing and heat treating; and results of improper preparation and use of tools. (J26, TS)

88-J. The Annealing of Nickel and High-Nickel Alloys. (Continued.) *Metallurgia,* v. 41, Feb. 1950, p. 191-196; Mar. 1950, p. 251-255.

Feb. issue: Soft, open, closed, salt-bath, electric-resistance, torch, dead-soft, temper, and low-temperature annealing. Mar. issue: Bright annealing, age hardening of "K" Monel, and various auxiliary factors. (J23, Ni)

89-J. A Center Quenched Hardenability Bar for Shallow Hardening Steels. Earl J. Eckel. *Metal Progress,* v. 57, Apr. 1950, p. 474-476.

Development of satisfactory test utilizing a simpler test bar. The proposed bar is drilled longitudinally and off-center to give a cylinder of varying wall thickness. When such a bar is quenched, cooling rate is a maximum in the thinnest section and gradually decreases to a minimum in the thickest section. Hence, by quenching, then sectioning transversely at its midpoint, and taking hardness measurements in a circle

concentric with the periphery of the bar, an indication of hardenability is obtained. (J26, ST)

90-J. Quenching of Carburized Gears. S. L. Widrig and Wilson T. Groves. *Metal Progress,* v. 57, Apr. 1950, p. 482-486.

Importance of quenching techniques in comparison with such things as "grain" and "fiber", prior heat treatment, and part geometry. Quenching practices in use at Spicer Mfg. Div.; plug and press fixture quenching; and open-tank quenching. (J26, T7, CN)

91-J. Hardness Variations in Carbon-Molybdenum Steels After Tempering. R. D. Chapman and W. E. Jominy. *Metal Progress,* v. 57, Apr. 1950, p. 491-492, 492B, 493-496.

Systematic data on tempered hardness as a function of as-quenched hardness for six steels of series 4000. (J26, J29, AY)

92-J. Localized Heating. Paul A. Furkert. *Gas Age,* v. 105, Apr. 13, 1950, p. 26-28, 65-66.

Use of gas flames for localized heating of metal articles, as used in welding, stress relieving, brazing of aluminum, etc. Disadvantages of salt-bath heating.
(J general, K general)

93-J. Getting More Out of Heat Treating. Part I. Howard E. Boyer. *Steel Processing,* v. 36, Apr. 1950, p. 195-198.

Review of some of the basic principles involved in the heat treatment of steel. An attempt is made to correlate some of these principles with end results and the relation of such results to engineering applications. Basic principals of metallic structures and transformations.
(J general, N8)

94-J. Protective Atmospheres in Industry. Parts XIV-XV. A. G. Hotchkiss and H. M. Webber. *General Electric Review,* v. 53, Mar. 1950, p. 36-39; Apr. 1950, p. 36-41.

Part XIV: Diverse industrial uses including inert-arc welding, safety in handling dusts or finely powdered materials, and for general purging operations in furnaces, gas holders, etc. Highly reducing atmospheres for processes such as atomic hydrogen welding and sodium hydride descaling. Part XV: Remedial measures for protective-atmosphere troubles sometimes encountered during operation. Possible sources of impurities and how to locate them. (To be continued.) (J2, K1, L12)

95-J. The Diffusion of Carbon and the Carburization Process. J. Taylor. *Journal of the Iron and Steel Institute,* v. 164, Mar. 1950, p. 257-264.

Difficulty of assessing case depths when shapes of curves are different. Method for calculating the relative active carburizing and soaking times when it is desired to reduce the surface carbon concentration of a carburized case. 12 ref. (J28, ST)

96-J. A Comparison of Six Spring Steels. Part I. Hardenability and Resistance to Grain Growth and Decarburization. Part II. Jominy Hardenability and Mechanical Properties After Hardening and Tempering. A. S. Kenneford and G. C. Ellis. *Journal of the Iron and Steel Institute,* v. 164, Mar. 1950, p. 265-277.

10 ref.
(J26, Q general, SG-b, CN, AY)

97-J Mass Marquenching. W. C. Hiatt and W. B. Cheney. *Automotive Industries,* v. 102, Apr. 15, 1950, p. 32-33, 114.

Tells how International Harvester is producing gears, shafts, king pins, and other parts capable of greater service life since modernizing and rearranging heat treating facilities at its Fort Wayne works. In addition to increasing quality of the finished products, marquenching (interrupted quenching) has reduced distortion and eliminated need for quenching presses, plugs, and similar equipment. Parts treated are made from 8620-H, 4620-H, 4815-H, and 4820-H steels. (J26, T7, AY)

98-J. Carburizing Pastes Permit Fast Low-Cost Selective Hardening. Julius Fish. *Materials & Methods,* v. 31, Apr. 1950, p. 72-74.

Two special paste compounds—one for hardening, the other for insulating against hardening—which provide an economical means of carburizing small quantities of steel parts. (J28, ST)

99-J. Rotary Retort Carburizing Cuts Gas Consumption. A. H. Allen. *Steel,* v. 126, Apr. 24, 1950, p. 74-76.

System for continuous carburizing of small steel part which eliminates manual loading and unloading, and minimizes maintenance. (J28)

100-J. Controlled Heat Treatment of Clock Springs. *Industrial Heating,* v. 17, Apr. 1950, p. 608, 610, 612.

Procedures at Borg Products Div., George Borg Corp., Delavan, Wis. (J general, T7, AY)

101-J. Oxy-acetylene Flame Hardening in Commercial Heat Treatment. J. T. Howat *Industrial Heating,* v. 17, Apr. 1950, p. 624, 626, 628, 630, 632, 696, 698, 700, 702. A condensation.

Flame-hardening applications including treatments to prevent machinery failures, methods of meeting machinery service conditions, choice of flame hardening processes, applications of flame hardening equipment, choice of fuel, characteristics of acetylene, fuel costs, controllability of flame hardening, and physical properties of the hardened parts. (J2)

102-J. Effect of Hardenability of a Steel on the Results of Flame Hardening. (In German.) Hans Wilhelm Grönegress. *Stahl und Eisen,* v. 70, Mar. 2, 1950, p. 192-196.

Investigated for a 1% C unalloyed steel; a Mn steel containing 1% C, 2% Mn, and 0.1% V; and a Cr steel containing 1% C and 1.2% Cr. Effects of diameter of the specimen, hardness depth, and burner output on "critical" diameter (diameter at which the core is 95% as hard as the surface) were determined. 10 ref. (J26, J2, CN, AY)

103-J. Low-Temperature Treatment of Steels. (In German.) Ernst Kunze. *Stahl und Eisen,* v. 70, Mar. 16, 1950, p. 227-232; discussion, p. 232-233.

Reviews literature, especially from the standpoint of economic feasibility. Its effect lies mainly in the transformation of residual austenite into martensite, resulting in greater hardness and volume stability. 24 ref. (J26, N8, ST)

104-J Embrittlement of Hardened Steel by Annealing at 250 to 400° C. (In German.) Hans Schrader, Hans-Joachim Wiester and Heinrich Siepmann. *Archiv für das Eisenhüttenwesen,* v. 21, Jan.-Feb. 1950, p. 21-31.

Addition of more than 0.04% Al to steels (low-carbon, Cr-Mn, and Mn steels) greatly reduces the embrittling effect of annealing; 0.8% practically eliminates it. Precipitation of nitrides of Cr and Mn is suspected to be the cause of the brittleness. 35 ref. (J23, Q23, CN, AY)

105-J. Furnace Atmosphere for Malleable Annealing. W. D. McMillan. *American Foundrymen's Society,* Preprint No. 50-8, 1950, 9 pages.

Composition and chemical reactions of atmospheres used for malleabilizing white cast iron; causes of ferritic and pearlitic rims; compositions effective in retarding decarburization; practice and precautions necessary with inflammable atmospheres. Results for a high-nitrogen atmosphere. "Carbon pressure" and advantages of a low combustible atmosphere. (J23, CI)

106-J. Surface Hardening of Pearlitic Malleable Irons. S. H. Bush, W. P. Wood, and F. B. Rote. *American Foundrymen's Society,* Preprint 50-53, 1950, 14 pages.

Flame and induction heating followed by oil, water, or spray quenches have been used as hardening treatments for nine irons varying widely in chemical composition, production practices, and microstructures. Case hardness and depth were determined by superficial Rockwell or Rockwell C measurements and metallographic examination of etched specimens. (J26, CI)

107-J. A Quench Cracking Susceptibility Test for Hollow Cylinders. Cyril Wells, C. F. Sawyer, I. Broverman, and R. F. Mehl. *Transactions of American Society for Metals,* v. 42, 1950, p. 206-231; discussion, p. 231-232.

Previously abstracted from Preprint. See item 9-267, 1949. (J26, AY)

103-J. An Engineering Analysis of the Problem of Quench Cracking in Steel. J. W. Spretnak and Cyril Wells. *Transactions of American Society for Metals,* v. 42, 1950, p. 233-266; discussion, p. 266-269.

Previously abstracted from Preprint. See item 18B-166, 1949. (J26, AY)

109-J. Pre-Bore Quench for Hollow Cylinders. J. W. Spretnak and C. C. Busby. *Transactions of American Society for Metals,* v. 42, 1950, p. 270-279; discussion, p. 280-282.

Previously abstracted from Preprint. See item 18B-167, 1949. (J26, AY)

110-J. Effects of Quenching Rate and Quench-Aging on the Tensile Properties of Aluminum Alloy 61S. R. C. Lemon and H. Y. Hunsicker. *Transactions of American Society for Metals,* v. 42, 1950, p. 357-372; discussion, p. 372-375.

Previously abstracted from Preprint. See item 18D-14, 1949. (J26, Q27, Al)

111-J. Heat Treatment of Steel. S. L. Gertsman. *Canadian Metals,* v. 13, Apr. 1950, p. 9-11, 42, 44-45.

An educational lecture. Various processes and fundamental theory of heat treatment. (J general, N8, ST)

112-J. Heat Treatment of Steel Forgings for Gas Turbines. H. W. Kirkby. *Metallurgia,* v. 41, Apr. 1950, p. 317-320.

Solution of several metallurgical and handling problems which arose because of the necessity of heat treating at temperatures near 1200° C., followed in some cases by quenching. (J26, T25, AY)

113-J. Focus on Quenching. R. C. Stockton. *Metallurgia,* v. 41, Apr. 1950, p. 321-326.

Importance of the cooling rate in heat treatment operations and the characteristics of various quenching agents. Quenching equipment and recommended cooling rates. (J26)

114-J. Automatic Control of Electric Furnaces for Heat Treatment. Leo Walter. *Metallurgia,* v. 41, Apr. 1950, p. 326-331.

(J general, S16)

115-J. Recent Heat-Treatment Furnace Installation. *Metallurgia,* v. 41, Apr. 1950, p. 332-340.

Some typical examples. (J general)

116-J. Radio-Frequency Heating by the Fabrication of Precision Machines and Apparatus. A. Leemann. *Microtechnic,* v. 4, Jan.-Feb. 1950, p. 33-36. Translated from the German.

Principles and equipment. (Title apparently should read "in the fabrication".) (J2)

117-J. Internal Stresses During Surface Hardening. (In Italian.) L. Locati and A. Ferro. *Metallurgia Italiana,* v. 42, Jan. 1950, p. 22-29.

Mechanism of formation of stresses, and formulas for determination. Importance of internal stress in finished products. Data on a carbon steel are tabulated and charted. (J26, Q25, CN)

118-J. Release of Residual Stresses in Quenched Alloys by Aging. (In Japanese.) Tadao Sano. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Nov. 1949, p. 13-15.

Studied for Ag-Cu, Ag-Mg, and Al-Cu alloys over a range of compositions. Includes phase diagrams. (J27, M24, Ag, Al)

119-J. The Decay of the Promotive Power of Carburizing Agents and Its Causes. (In Japanese) Eisho Fuji. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Sept. 1949, p. 23-28.

It is generally known that the promotive power of a carburizing agent gradually decreases on repeated use. Decay rates of $BaCO_3$, Na_2CO_3, and their mixtures were determined. Activity of Na_2CO_3 decreased most rapidly and that of the mixture the most slowly. Possible causes. (J28, ST)

120-J. Fundamental Study of Mild Carburization. II and III. (In Japanese.) Masuo Kawakami and Eisho Fuji. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Nov. 1949, p. 25-30.

In Part II, mild carburization in the presence of inhibitors such as Al_2O_3 or $Ca_3(PO_4)_2$ and of promoters such as $BaCO_3$ or Na_2CO_3 was studied. Part III: A quantitative mathematical analysis shows the results of interaction of inhibitors and promoters. 12 ref. (J28, ST)

121-J. Increasing the Strength of High Speed Toolsteels by Annealing. (In Russian.) E. I. Malinkina. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Feb. 1950, p. 21-23.

Influence of annealing at 720-780° C. on microstructure and mechanical properties of the high speed steels. (J23, TS)

122-J. Heat Treating Stainless Steel. L. F. Spencer. *Iron Age,* v. 165, May 11, 1950, p. 65-69; May 18, 1950, p. 86-89.

Characteristics of stainless steels and heat treatment procedures for obtaining desired properties. Includes typical microstructures, graphs of mechanical properties vs. quenching and tempering temperatures, and a table of chemical corrosion resistance vs. quenching temperature. Second part describes furnace equipment and methods, also various pickling procedures. (J general, Q general, R5, L12, SS)

123-J. Ammonia Saves Money in Atmosphere Annealing. L. H. Seabright and N. K. Koebel. *Iron Age,* v. 165, May 18, 1950, p. 81-85.

How substantial savings can be realized by using a 75% H_2 + 25% N_2 mixture for annealing electric metals. The atmosphere is produced in an ammonia dissociator, eliminating storage and handling of cylinder hydrogen. Includes tables of magnetic properties of Armco magnetic iron, showing effects of annealing procedure (H_2 or dissociated NH_3), and of electroplating. Comparative magnetic properties of 1% Si and 4% Si steels and of Allegheny 4750 (47% Ni, 53% Fe.) (J23, J2, P16, Fe, AY, Ni)

124-J. Prepared Protective Atmospheres. E. G. deCoriolis. *Iron and Steel Engineer,* v. 27, Apr. 1950, p. 76-82.

Various types of atmospheres for use in the steel industry. Diagrams and illustrations show details of construction of gas-generating equipment made by Surface Combustion Corp. (J2, ST)

125-J. Stress-Relief Heat Treatment of Alloy Cast Iron. M. M. Hallett. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. A28-A39; discussion, p. A33-A39.

Previously abstracted from *Foundry Trade Journal.* See item 18B-159, 1949. (J1, CI)

126-J. The Influence of Heating Rate in Malleable Iron Annealing. S. W. Palmer. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. A40-A58; discussion, p. A59-A60.

Previously abstracted from *Engineering.* See item 18B-139, 1949. (J23, CI)

127-J. Strengths Obtainable by High-Temperature Age Hardening of Magnesium Alloys Containing 7% Al. (In German.) W. Bulian. *Metall,* v. 4, Apr. 1950, p. 136-137.

The alloys investigated contained 7.25% Al, 1.0% Zn, 0.1% Mn, and balance Mg. They were aged at 150-220° C. for 15-50 hours. Results show that optimum results are obtained upon aging at 200° C. for 20 hr. Effects of impurities and degree of hot working. (J27, Q23, Mg)

128-J. Martempering of Automotive Gears and Shafts. S. L. Widrig and Wilson T. Groves. *Metal Progress,* v. 57, May 1950, p. 607-612.

Martempering is usually regarded primarily as a means of improving the toughness of hardened parts. It was found that it also avoids distortion so satisfactorily that automotive gears, of carburized low-alloy steel, ordinarily press or plug quenched, can be martempered successfully in production in oil at 350° F. (J26, T7, AY)

129-J. Practical Controlled-Atmosphere Furnace Applications Reduce Heat Treating Costs. O. E. Cullen. *Steel,* v. 126, May 22, 1950, p. 74-76, 100.

Choice of atmosphere-generating equipment and furnaces for various applications. (J2)

130-J. Getting More Out of Heat Treating. Part II. Howard E. Boyer. *Steel Processing,* v. 36, May 1950, p. 251-253, 256.

Concludes elementary explanation of basic principles involved in heat treatment of steel. Isothermal heat treatment and its modifications. Typical photomicrographs show steel in different conditions of heat treatment. (J general, ST)

131-J. Protective Atmospheres in Industry. Part XVI. (Concluded.) A. G. Hotchkiss and H. M. Webber. *General Electric Review,* v. 53, May 1950, p. 26-30.

Procedures for correcting conditions that sometimes lead to undesirable effects. Numerous practical suggestions for applying remedies. (J2)

132-J. A Study of the Carburization Process With Special Reference to Gas Carburizing. D. S. Laidler and J. Taylor. *Journal of the Iron and Steel Institute,* v. 165, May 1950, p. 23-39.

Development, as a result of comprehensive experiments on both laboratory and semi-works scales, of a successful carburization process, using town gas as the carburizing medium. Mechanism of the carburization process in the light of experimental carburizations in pure CO. Variables considered are steel composition, temperature, surface activation, and gas velocity. Gas-reaction/time and carbon-absorption/time curves. Case-depth/time curves for a number of steel and different temperatures, and diffusivity coefficients. New method for reducing O_2 and CO_2 by passing the gas over a barium-compound catalyst. 16 ref. (J28, ST)

133-J. Quenching Media; Experimental Studies of Evaluation by the Jominy Test. Howard E. Boyer. *Iron and Steel,* v. 23, May 1950, p. 177-180.

Data were obtained by reversing the principle of the normal Jominy test; that is, steels of known hardenability value were heated and quenched by means of quenching media which varied in composition and temperature. Apparatus designed for the new method; photomicrographs show typical structures obtained. (J2, ST)

134-J. Transfer of Material Between Furnace Atmosphere and Furnace Charge. (In German.) Walter Litterscheidt. *Gas- und Wasserfach,* v. 91, Apr. 15, 1950, p. 79-82.

The various ways in which the furnace atmosphere can affect iron or steel during heat treatment. These effects can be oxidation and reduction, carburization and decarburization, as well as hardening effect of decomposing NH_3 (nitriding). (J2, ST)

135-J. Directions for Autogeneous Surface Hardening. (In German.) K. Boeckhaus. *Schweissen und Schneiden,* v. 2, Apr. 1950, p. 73-78.

Equipment for surface hardening various shapes and metal forms. (J2, ST)

136-J. Methods of Measuring Case Depth. *American Machinist,* v. 94, May 29, 1950, p. 101, 103.

A recommended practice that will appear in the 1950 edition of SAE Handbook. (J28)

137-J. Profitably Operating the Small Commercial Heat Treating Plant. Olin Rutledge. *Industrial Heat-*

ing, v. 17, May 1950, p. 804-806, 808, 922, 924, 926, 928.

Equipment and procedures of Columbus Steel Treating Co., Columbus, Ohio, and Zanesville Steel Treating Co., Zanesville, Ohio. (J general, A5, ST)

138-J. Heat Treating Shakeproof Fastenings. J. Wallerius. *Industrial Heating,* v. 17, May 1950, p. 810, 812, 814, 816.

Equipment and procedures of Shakeproof, Inc. Miscellaneous carbon steel washers, clips, nuts, and bolts are treated. (J general, T7, CN)

139-J. Safety Procedures for Protection Against Flammable Atmosphere Hazards of Special Atmosphere Furnaces. II. *Industrial Heating,* v. 17, May 1950, p. 818, 820, 822, 824.

Recommended procedure when explosive mixtures cannot always be avoided because the process requires turning on and off the special atmosphere while the furnace is cold and when an inert-gas purge is not practical; protection against interruption of flow of special atmosphere; and special atmosphere generator safeguards. (J2)

140-J. Controlled Cooling of Steel Blooms in Car Bottom Furnaces. *Industrial Heating,* v. 17, May 1950, p. 826, 828, 830. Based on paper by C. J. F. Burch.

Use of cycle annealing of alloy steel blooms to prevent formation of internal cracks known as flakes. By this method, conditioning costs were reduced. Defects were removed by chipping instead of grinding. (J23, AY)

141-J. Esco Water Quench Increases Casting Speed and Uniformity. James Thomas Gow. *Western Metals,* v. 8, May 1950, p. 24-25.

Method developed by Electric Steel Foundry, Portland, Ore. Table gives mechanical properties of "Esco Alloy 12M" after four different heat treatments, showing superiority of new method. (J26, AY)

142-J. Heat Treatment of Alloy Steels. C. E. McDermott. *Industrial Heating,* v. 17, May 1950, p. 790-792, 794, 796, 798.

Definitions and simple explanations of various heat treating terms. Also their metallurgical background. (To be continued.) (J general, AY)

143-J. Localized Heating. Paul A. Furkert. *Industrial Gas,* v. 28, June 1950, p. 6-7, 23-26.

Various ways in which localized gas heating is or might be used in heat treating, heating for forging, or soldering and brazing. Shows how salt baths can be eliminated in many cases. (J general, K7, K8)

144-J. Reduced Operating Costs Highlight Operation at Taylor-Wharton Iron and Steel Co. S. M. Stoler. *Instrumentation,* v. 4, 2nd qtr. 1950, p. 12-13.

Design and operation of normalizing furnace and controls. (J24, S16, ST)

145-J. How To Determine Case Hardenability. Richard F. Harvey. *Steel,* v. 126, June 26, 1950, p. 80-82, 84.

Use of microhardness tests. Procedure also can be applied to measurement of decarburization depth of cyanided and nitrided cases as well as to surfaces hardened selectively by induction or flame-hardening techniques. (J28, ST)

146-J. Modern Heat Treating. III. Interrupted Quenching. William Adam Jr. and Leon B. Rosseau. *Metal Progress,* v. 57, June 1950, p. 765-768.

Several items of heat treating lore are shown to be false upon scientific investigation. One is that the faster the quench the harder the steel—whereas carbon content is the ruling factor. Another is that a cold quenching bath is necessary for adequate hardening, yet agitated molten salt has high cooling power. A third is that annealing requires very long times and slow coolings, yet cyclic annealing violates both rules. How modern salt baths and furnaces fit these findings. (J26, J2, ST)

147-J. Quality Heat Treating Builds Small Shop. John C. McComb. *Steel Processnig,* v. 36, June 1950, p. 297-301.

Equipment and procedures of Walker Heat Treating Co., Cleveland. This shop specializes in the treating of toolsteels, die-casting dies, plastic-forming dies, and similar work. (J general, TS)

148-J. Heat Treatment of High Pressure Cylinders. S. M. Stoler. *Steel Processing,* v. 36, June 1950, p. 302-303, 317.

Continuous heat treatment of cylinders at Taylor-Wharton Iron and Steel Co., using new high thermal head heating methods. Advantages. (J1, T26, ST)

149-J. Thin Metal Parts Successfully Heated by Induction. Joseph F. Libsch and Anthony Vescuso. *Wire and Wire Products,* v. 25, June 1950, p. 498-499, 519-521.

Advantages of induction heating for small wires and metal parts lie primarily in its ability to avoid distortion of the work. Describes technique using a standard commercial

converter operating at 500 kc. or less, suitable for heat treatment of both small and large sections. (J2)

150-J. Controlled Cooling of Steel Blooms in Car Bottom Furnaces. Charles J. F. Burch. *Iron and Steel Engineer,* v. 27, June 1950, p. 86-94; discussion, p. 94.

Proposed method for transferring blooms into car-bottom furnaces for controlled cooling after rolling. Blooms can be charged into furnace before temperature of any bloom falls below 600° F. (J21, ST)

151-J. Heat Treating Bolts Quickly and Efficiently at Oldsmobile. *Industrial Heating,* v. 17, June 1950, p. 964-966, 968, 970.

Line consists of hardening furnace, oil quench, cleaning machine, and draw-furnace. (J26, T7, ST)

152-J. Heat Treatment of Alloy Steels. II. (Concluded.) C. E. McDermott. *Industrial Heating,* v. 17, June 1950, p. 980, 982, 984, 986.

Definitions and explanations of quenching factors, tempering, austempering, and martempering. Some advantages and limitations of these processes. (J26, AY)

153-J. New Furnaces Heat Copper Billets and Anneal Strip Continuously. *Industrial Heating,* v. 17, June 1950, p. 998, 1000.

Continuous billet heater and continuous roller-hearth, bright-annealing furnace at California plant of Revere Copper & Brass, Inc. (J23, Cu)

154-J. Western Metal Processing Methods Stepped Up by Gas Equipment Improvements. Ralph W. Marshall. *Western Metals,* v. 8, June 1950, p. 26-29.

Various procedures and equipment in which gas is used as fuel. Includes heat treating, joining, forging, melting, heating of pickling and other solutions, etc. (J general, B18)

155-J. Induction Heating. *Canadian Metals,* v. 13, June 1950, p. 12.

Briefly describes process. (J2)

156-J. Carburizing With Prepared Town's Gas. L. G. W. Palethorpe. *Machinery* (London), v. 76, June 8, 1950, p. 815-820.

Preparation of the gas, equipment for carburizing, and recommended carburizing procedures. (J28, ST)

157-J. Heat Treatment of High Speed Steel Tools; The Use of Efco-Ajax-Holtgren and Efco-Sentry Equipment. R. C. Stockton. *Machinery* (London), v. 76, June 1, 1950, p. 778-782.

The Efco-Ajax-Hultgren equipment utilizes salt baths in three stages of treatment. The Efco-Sentry equipment utilizes a carbon muffle which is replaced when worn away by slow burning at the hardening temperature in the presence of a limited amount of air. It is suitable primarily for small-quantity work. (J26, J2, TS)

158-J. Annealing Aluminum Sheet. *Linde Tips,* and *Oxy-Acetylene Tips,* v. 29, July 1950, p. 62-63.

Simple procedure using the oxy-acetylene flame only. It can be applied to those Al alloys which are work hardened by rolling, such as 2S, 3S, and 52S. (J23, J2, Al)

159-J. Isothermal Annealing Improves Forging Machinability. A. H. Allen. *Steel,* v. 127, July 10, 1950, p. 84-85.

By salt-bath annealing alloy-steel ring gears and other automobile parts after press forming, Ford eliminates snot cleaning, lengthens cutter life up to 75%, and cuts need for relapping. (J23, T21, AY)

160-J. Production Case Hardener. W. L. Corteggiano. *Machine Design,* v. 22, July 1950, p. 125-127.

Westinghouse development, the horizontal rotating scanner with automatic work loader, designed to selectively case harden miscellaneous cylindrical parts. (J28, ST)

161-J. Quenching; Some Aspects of the Rate of Cooling in Various Media. *Iron and Steel,* v. 23, June 1950, p. 303-306.

Mechanism of the process; effects produced on the bodies quenched; cooling media. Cooling curves for the center of various shapes and sizes. (J26, J2)

162-J. Application of Sawdust During Carburization. (In Russian.) V. P. Gerassimov. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Mar. 1950, p. 26.

Proposes use of sawdust, heated previously to 500° C., instead of charcoal for carburization. (J28, ST)

163-J. The Hardening Operation in the Practical Heat Treatment of Steel. Quintin C. McMillan. *West of Scotland Iron and Steel Institute, Journal,* v. 56, 1948-49, p. 98-119; discussion, p. 120-125.

Commercial equipment and procedures, as well as their fundamental metallurgical basis. Hardenability testing and effects of different heat treatment schedules on hardness and impact strength of unalloyed and low-alloy steels. (J26, ST)

164-J. Research on the Soft Annealing of Unalloyed and Low-Alloy Steels. (In German.) Sepp Ammareller. *Stahl und Eisen,* v. 70, May 25, 1950, p. 459-463.

Methods for soft annealing structural and toolsteels. Rate of spheroidization of cementite in steels containing 0.65-1.35% C and effect of temperature on the cementite were studied. (J23, N8, CN, TS)

165-J. The Hardening Behavior of the Refined Steels. (In German.) Ernst Kunze. *Stahl und Eisen,* v. 70, May 25, 1950, p. 475-476.

Critically reviews a German book by J. Kubasta which proposes a "transformation index" as a method of indicating the hardenability of a given steel and a formula for computing hardness depth. (J26, ST)

166-J. (Book) High-Frequency Induction Heating, Ed. 2. Frank W. Curtis. 389 pages. 1950. McGraw-Hill Book Co., 330 West 42nd St., New York 18. $6.00.

Explains fundamental electrical principles involved. Many applications to specific heating problems—for hardening metal parts, joining of metal assemblies, etc. Types of steel best suited to induction hardening and various means of quenching. A comprehensive analysis of coil design and new material on fixture designs are included in this new edition. Material has been amplified on brazing alloys and fluxes, on localized hardening, and on joining of metal assemblies. (J2)

167-J. How To Evaluate Induction Heating for Forging, Forming. *Steel,* v. 127, July 24, 1950, p. 58-60.

Procedures and applications to forging, heat treatment and heating for various forming operations. (J2, F22, G general)

168-J. How To Cut Heat-Treat Costs. Roy F. Kern. *American Machinist,* v. 94, July 24, 1950, p. 134-139.

Use of analysis of general heat treating practices, careful equipment selection, scientific shop layout, sound metallurgical control, and planned preventive maintenance. (J general)

169-J. Scale Reduction in Controlled Atmosphere Cycle Annealing. D. A. Payntor. *Industrial Gas,* v. 29, July 1950, p. 10-12, 21-24.

Furnace construction, atmosphere composition, furnace cycle, production rates, and operation costs involved in handling parts of A8620 composition at rates up to 3400 lb. per hr., at Salisbury Axle Works, (J23, AY)

170-J. New Quenching Methods Avoid Cracking—Improve Performance. J. H. Chapman. *Western Metals,* v. 8, July 1950, p. 22-23.

The austempering and martempering processes, their advantages, and applications. (J26, ST)

171-J. Combination Quench Reduces Aluminum Warpage. Glen A. Robinson. *Iron Age,* v. 166, July 27, 1950, p. 55-57.

When solution heat treating aluminum, Northrop Aircraft quenches first in "fog", then in water. Warpage is cut to a point where little or no straightening is required. Physical properties are shown to be equal to those developed by plain water quenching. (J27, A1)

172-J. Stress Relief. *Metal Progress,* v. 58, July 1950, p. 79-80, 112, 114, 116, 118.

Relief of excessive fabrication stresses is especially important in large welded structures. T. McLean Jasper outlines four possible methods using heat or prestressing and Wm. C. Stewart presents some data on magnitude of stresses remaining after definite heat treatments. (J1, G23, ST)

173-J. Steering Parts Heat Treated Continuously at Nash Motors. *Industrial Heating,* v. 17, July 1950, p. 1144-1146, 1148.

Equipment and procedures. (J general, T21, ST)

174-J. Use of Improved Tools Lowers Production Costs in Commercial Heat Treating. *Industrial Heating,* v. 17, July 1950, p. 1176, 1178, 1186.

Equipment and procedures of Pittsburgh Commercial Heat Treating Co., Pittsburgh, Pa. (J general, A5)

175-J. Effect of Time on the Tempering of Steel. (In Czech.) Ladislav Jenicek and Vlastimil Dlouhy. *Hutnicke Listy,* v. 5, Apr. 1950, p. 149-155.

On the basis of examples from the literature and from the authors' experience, it is shown that hardness change may not be directly related to changes in other mechanical properties. The same comment applies to dimensional stability after quenching. 26 ref. (J29, ST)

176-J. Studies on the Quenching Velocity of Complex Light Alloys. (In Japanese.) Takuichi Morinaga and Yuzo Nakanishi. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Dec. 1949, p. 6-9.

Temperature of the specimens (three standard shapes) during quenching was recorded on photographic paper by means of an oscillograph connected to a thermocouple inserted in the specimen. Re-

sults are given for the quenching ability of water, soybean oil, and air at various temperatures. Water is shown to be superior to the other media. (J26, Al, Mg)

177-J. The Mild Carburization of Chromium Steel. V. The Meaning of Case-Depth Measurement. VI. Development of Three Equations of Carburization. (In Japanese.) Hisao Matsumoto. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Dec. 1949, p. 18-23.

Part V: The various methods of case-depth measurement and comparison of results. Part VI: Three equations are developed and applied to carburization of plain carbon and alloy steels. (J28, ST)

178-J. Study on the Quick Annealing of Black Heart Malleable Cast Iron. (In Japanese.) I. Shizuya Maekawa and Takeshi Yamashita. II. Shizuya Maekawa, Takeshi Yamashita, and Tetsuji Yamaguchi. *Journal of the Casting Institute of Japan,* v. 21, no. 12, 1949, p. 5-21.

Part I: Range of white cast iron; effects of melting temperature; effects of graphitization velocity; change of microstructure on heating; determination of time of complete graphitization; and conditions for quick annealing process. Part II: Casting of white cast iron and its graphitization velocity; relationship of chemical composition and annealing conditions; mechanical properties resulting from quick annealing; microstructure at various stages of annealing; and ideal chemical compositions and treatments. (J23, N8, CI)

179-J. Electric Furnaces Anneal Jet Engine Parts. *Iron Age,* v. 166, Aug. 3, 1950, p. 84.

At Solar Aircraft Co., San Diego, Calif. Parts are stainless steel. (J23, SS)

180-J. Steam Treated Tools Last Longer. *Tool & Die Journal,* v. 16, Aug. 1950, p. 46, 48.

New heat treating procedure using an electrically heated furnace of the forced convection type, in which a steam atmosphere is circulated by a high-pressure fan. Steam reacts with the surface of the steel to produce a thin film of blue magnetic iron oxide, Fe_3O_4, which has good resistance to corrosion, and can retain cutting and lubricating oils. (J2, TS)

181-J. How Cleveland Pneumatic Heat Treats Giant Forgings. *Steel,* v. 127, Aug. 14, 1950, p. 102, 105.

Various types of equipment for a number of heat treating operations. (J general)

182-J. Heat Treatment of Non-Ferrous Metals. H. V. Kinsey. *Canadian Metals,* v. 13, July 1950, p. 11-15, 48.

Practical procedures and effects on structures of the metals. Includes paragraphs on recrystallization, cold working effects, grain size effects, recovery, age hardening, diffusion, and precipitation. (J general, N general, EG-a)

183-J. Modern Furnace for Flash Annealing. *Canadian Metals,* v. 13, July 1950, p. 16, 47.

Equipment and procedure of British firm, used for flash annealing of Al and Al alloys. (J23, Al)

184-J. Flame Hardening. E. F. Green. *Canadian Metals,* v. 13, July 1950, p. 32-35, 44-45.

Equipment and procedures for application to iron and steel. (J2, ST)

185-J. Annealing of Alloy Toolsteel After High-Frequency Tempering. (In Russian.) I. N. Kidik. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, May 1950, p. 22-23.

Influence of conditions of annealing on hardness and impact strength. Such influence was found to be dependent upon structural changes within the steel brought about by the tempering treatment. (J23, J29, TS)

186-J. Nitriding the Martensitic Stainless Steels. Part I. Howard E. Boyer. *Steel Processing,* v. 36, July 1950, p. 353-357.

Classification of stainless steels into three different groups. Data confined mainly to Class 1 group—the martensitic type. Includes depth-hardness curves for six different high-alloy steels. (To be continued.) (J28, SS)

187-J. Rapid Tempering by Induction Heating. Joseph F. Libsch. *Metal Progress,* v. 58, Aug. 1950, p. 176-180.

Short-time tempering by induction heating may be applied successfully to plain carbon and low-alloy steels, provided that temperature is increased to compensate for the short time of exposure. Includes tempering curves for 1050 and 3140 steels, graphs correlating mechanical properties and heat treatment, and a table of tempering treatment vs. hardness and impact energy for 4150 steel. (J29, J2, CN, AY)

188-J. Cylindrical Parts Induction Heated in Continuous High Speed Production. W. L. Corteggiano. *Steel,* v. 127, Aug. 21, 1950, p. 94-95, 104.

See abstract of "Production Case Hardener," *Machine Design,* item 160-J, 1950. (J28, ST)

189-J. Flame Hardening Now Widely Used for Surface Hardening Steels and Irons. E. F. Green *Materials & Methods*, v. 32, Aug. 1950, p. 56-59.

Applicability to various steels and irons; auxiliary quenching and stress-relieving steps which are often necessary; methods, equipment, and fuels; testing and inspection. (J2, ST)

190-J. Automatic Heat Treatment of Crankshafts at Oldsmobile Division. *Industrial Heating*, v. 17, Aug. 1950, p. 1324-1326, 1328, 1330, 1332.

Equipment and procedures. (J26, T21, ST)

191-J. Localized Heating. Paul A. Furkert. *Industrial Heating*, v. 17, Aug. 1950, p. 1334, 1336, 1338, 1340, 1342.

Ways in which gas burners of special design can be used to heat limited zones of metallic articles for various fabrication purposes, including localized heat treatment, brazing, silver soldering, stress relief, etc. (J2, K7, K8)

192-J. Airetool Tube Expanders and Cleaners Carefully Heat Treated. *Industrial Heating*, v. 17, Aug. 1950, p. 1350, 1352, 1354, 1356.

Equipment and procedures for heat treating alloy steel tube expanders, cleaners, and refinery specialties. (J general, T29, AY)

193-J. Fast, Flexible, Versatile Commercial Service Offered by Cook Heat Treating Corporation. *Industrial Heating*, v. 17, Aug. 1950, p. 1360-1362, 1364, 1366, 1459-1460, 1462, 1464, 1466, 1468, 1470, 1472.

Equipment and procedures of Los Angeles firm. (J general)

194-J. Carbon Restoration Overcomes 'Soft Skin' on Parts. E. C. Bishop. *American Machinist*, v. 94, Aug. 21, 1950, p. 111-118.

How steel can be restored to original carbon content by batch or continuous heat treatment. Often carbon restoration can be combined with hardening or annealing. Charts facilitate proper control of the furnace atmosphere and temperature for carbon and alloy steels. (J2, CN, AY)

195-J. Nitriding the Martensitic Stainless Steels. Part II. (Concluded.) Howard E. Bover. *Steel Processing*, v. 36, Aug. 1950, p. 403-407, 421.

Study of microstructures from specimens of each type tends to substantiate results shown by the depth-hardness charts, as well as statements made in Part I. 48-hr. salt-spray test specimens show effects of different heat treatments. (J28, SS)

196-J. Induction Hardening Arbor Used on Automatic Screw Machine. Walter G. Patton. *Iron Age*, v. 166, Aug. 24, 1950, p. 65-67.

Two automatics at General Motors' Saginaw Steering Gear Div. that turn bar stock into completely machined bearings and harden them, too. Hardening is done by induction coil and quench arbors mounted on the tool slides. Material specifications call for SAE 1144. (J2, G17, CN)

197-J. Gas Carburization. S. C. Churchill. *Machinery* (London), v. 77, Aug. 10, 1950, p. 172-175.

Difficulties encountered. Mechanism of the solution of carbon in iron. Case hardening of various steels. (J28, ST)

198-J. Induction Surface Hardening Expedites Production, Saves Manpower. *Steel*, v. 127, Aug. 28, 1950, p. 77-78.

Induction hardening carbon-steel parts. (J2, CN)

199-J. Continuous Carburizing Adapted to Job Shop Lots. Herbert Chase. *Iron Age*, v. 166, Aug. 31, 1950, p. 61-63.

How parts are simultaneously carburized to three different case depths in a radiant-tube pusher furnace. (J28, ST)

200-J. Carbo-Nitriding for the Mass Production of Gears. Frank M. Scotten. *Production Engineering & Management*, v. 26, Sept. 1950, p. 53-56.

Practical advantages from this type of case hardening of alloy-steel gears and parts for automatic transmissions at Detroit Gear Div., Borg-Warner Corp. (J28, T21, AY)

201-J. Induction Heating Provides Economy in Production. L. F. Graves. *Production Engineering & Management*, v. 26, Sept. 1950, p. 68-70.

The part is a "snapping roll end ring" used on one and two-row corn harvesters produced by Allis-Chalmers. Cost analysis shows cost reduction of over 40% in comparison with previous procedure—carburization and hardening. (J2, T3, CN)

202-J. Twin Batch-Type Carbonitriding Furnaces Precision-Harden Transmission Pinions. A. H. Allen. *Steel*, v. 127, Sept. 4, 1950, p. 84-85, 104.

Installation at Chevrolet-Cleveland transmission plant. Pinions are SAE-5145 steel. (J28, T21, AY)

203-J. Nitriding—Effect on Fatigue Strength of Stainless Steel. V. T. Malcolm and S. Low. *Journal of Metals*, v. 188, Sept. 1950, p. 1094-1095.

Malcomizing process developed by Chapman Valve Mfg. Co. is a nitrid-

ing process primarily developed to permit surface hardening of both the austenitic and ferritic stainless steels. Comparative mechanical test data. (J28, Q7, SS)

204-J. Heat Treatment Plant in the Needle Industry. *Wire Industry,* v. 17, Aug. 1950, p. 659-660.

British equipment. (J general, T10, ST)

205-J. The Relief by Heat Treatment of Externally Applied Stresses to Cast Iron. G. N. J. Gilbert. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Aug. 1950, p. 499-514.

Effect of temperature and time at temperature on the progress of stress relief. A test piece was stressed under conditions of measured stress and then the system was raised to an elevated temperature and, maintaining the strain constant, stress was progressively reduced. Under these conditions, there is a measured imposed stress being relaxed in a manner which may be similar to the relief of casting stresses by heat treatment. (J1, CI)

206-J. Waste-Heat Recovery From a Heat Treatment Furnace; Production of Electrical Energy and Simultaneous Supply of Heat to a Central Heating System. (In French.) *Fonderie,* June 1950, p. 2075-2080.

Installation in a French metallurgical plant. (J general)

207-J. Determination of the Annealing Cycle of Blackheart Malleable Cast Iron. (In French.) Gabriel Joly. *Fonderie,* June 1950, p. 2097-2099.

Technique and factors involved, such as content of Si, Cr, and Mn; overheating prior to casting, furnace atmosphere, rate of cooling after casting, purity of the initial material, etc., and their influence on the annealing cycle. (J23, CI)

208-J. Germans Study Temper Embrittlement. W. M. Baldwin, Jr. *Iron Age,* v. 166, Sept. 14, 1950, p. 92-97. Translated and condensed from "Embrittlement of Hardened Steel by Annealing at 250 to 400° C.", Hans Schrader, Hans-Joachin Wiester, and Heinrich Siepmann.

Previously abstracted from *Archiv für das Eisenhüttenwesen.* See item 104-J, 1950. (J23, Q23, CN, AY)

209-J. Castings Stress Relieved by the Trayfull. *Steel,* v. 127, Sept. 25, 1950, p. 75.

To relieve possible internal stresses and to remove traces of foundry sand and other adhering impurities, all castings, gray iron and malleable, used in the manufacture of the Chevrolet automatic transmission are given a special normalizing furnace treatment, followed by a caustic dip. (J1, T21, CI)

210-J. Three Low-Alloy Steels, Austempered Versus Oil Quenched. R. L. Rickell and F. C. Kristufek. *Metal Progress,* v. 58, Sept. 1950, p. 325-329, 390.

Three commercial low-alloy steels (2335, 6150 and 4063) were austenitized 15 min. after reaching heat in a furnace with a slightly decarburizing atmosphere and then austempered in a relatively large salt bath. Other samples were also quenched in oil at room temperature and tempered immediately in a salt bath. Tensile tests, fatigue tests and impact tests indicate that the relationship between hardness and tensile strength of low-alloy steel is about the same whether the specimen is austempered or quenched and tempered. (J26, AY)

211-J. Causes of Tool Failures. II. Improper Heat Treatment. J. Y. Riedel. *Metal Progress,* v. 58, Sept. 1950, p. 340-344.

In an investigation of several thousand tool failures, about 80% were caused by improper heat treatment. Examples of tools that cracked during or shortly after incorrect hardening treatment, and recommendations for avoiding such cracking. (J26, S21, TS)

212-J. Stress Relief of Stainless 347 Investigated. L. H. Satz. *Iron Age,* v. 166, Sept. 28, 1950, p. 78-81.

Tests show that the amount of stress relief that can be obtained in Type 347 stainless is more dependent on temperature than on time. Per cent stress relief accomplished at any one temperature between 932 and 1652° F. was found to be about the same whether the material was stressed to 39 or to 75% of the yield strength. (J1, Q25, SS)

213-J. Flame Hardening. E. F. Green. *Western Machinery and Steel World,* v. 41, Sept. 1950, p. 70-73, 95.

Procedures, equipment, and basic principles as applied to steel and cast iron. (J2, ST, CI)

214-J. Stainless Steel Strip Annealed in Continuous Furnace. W. A. Stermer. *Industrial Heating,* v. 17, Sept. 1950, p. 1524-1526.

Equipment of Washington Steel Corp., Washington, Pa. (J23, SS)

215-J. Influence of Zirconium on Malleabilization of White Cast Iron.

Howard E. Bleil and John Varga, Jr. *Foundry,* v. 78, Oct. 1950, p. 94-99.

Heats containing 0.054-0.329% Zr were used. The time necessary for complete solution of cementite at the upper critical point was greater with increased amounts of Zr. Specimens examined for second-stage annealing effects were normal with respect to completion of malleabilization. (J23, CI)

216-J. Automatic Vertical-Slot Furnace. *Engineering,* v. 170, Sept. 1, 1950, p. 198-199.

Heat treating furnace of unique design made by a British firm. The furnace, which is gas-fired, consists of a long vertical slot lined with refractory, just wide enough for the workpiece. Bars or sections are fed into the top of the furnace and are conveyed downwards by an automatic mechanism through upward-flowing hot gases, onto a roll conveyor which discharges them at a speed of 200-300 per hr. (J general)

217-J. Industrial Electric Furnaces; A Review of Modern Furnaces Used in Processing and Heat Treatment. P. F. Hancock. *Metal Treatment and Drop Forging,* v. 17, Summer 1950, p. 65-72, 77.

(J general)

218-J. Temper Brittleness and Hardness. (In German.) Gerhard Riedrich. *Archiv für das Eisenhüttenwesen,* v. 21, May-June 1950, p. 165-174.

Effects of tempering three low-alloy steels at different cooling rates on hardness, impact toughness, and structure. Segregation of carbides at the grain boundaries is the suspected cause of temper brittleness. (J29, Q general, AY)

219-J. The Age-Hardening of Copper-Cadmium Alloys. (In German.) Hans-Günter Schlösser and Günter Wassermann. *Zeitschrift für Metallkunde,* v. 41, June 1950, p. 162-170.

Effects of Cd content, homogenizing temperature, and quenching media on mechanical properties, as well as effect of aging on the alloy containing 4.3% Cd, at different temperatures. Effect of rolling on age hardening. 15 ref.
(J27, Q general, Cu)

220-J. Industrial Annealing and Tempering of Polished Steel, With Special Reference to Scaling, Decarburization, Heating Rate, and Temper Brittleness. (In German.) Walter Hülsbruch. *Stahl und Eisen,* v. 70, July 20, 1950, p. 641-653.

Recommended equipment and procedures; effects of factors involved. 37 ref. (J23, J29, ST)

221-J. Effect of Design and Energy Input of Electric Heat Treating Furnaces on Output Rate and Uniformity of Strength Properties of Bar Steel. (In German.) Herbert Müller. *Stahl und Eisen,* v. 70, July 20, 1950, p. 654-658.

To determine optimum heat treating conditions, experiments were made with two different furnaces with and without air circulation and with variable temperatures, types of stacking, and power input. Results show that high energy input results in nonuniform physical properties without materially increasing efficiency of the furnace. Loose stacking and circulating air are also recommended. (J general, ST)

222-J. An Analysis of Flame Hardening. Edwin F. Green. *Steel Processing,* v. 36, Sept. 1950, p. 455-459.

See abstract of "Flame Hardening Now Widely Used for Surface Hardening Steels and Irons," *Materials & Methods,* item 189-J. (J2, ST)

223-J. Plow Plant Production Streamlined. *Industrial Gas,* v. 29, Sept. 1950, p. 8-9.

Furnace equipment and procedures of Graham-Hoeme Plow Co., Amarillo, Tex., for heat treating, forging, and finish drying.
(J general, F22, ST)

224-J. Refractory Practice in the Whiting-Cole Recirculating Annealing Oven. Ray A. Witschey. *Canadian Metals,* v. 13, Sept. 1950, p. 26-27, 38.

(J23)

225-J. Heat Treatments; Their Selection and Specification in Design. Part 1. Toughness. Norman N. Brown. *Machine Design,* v. 22, Oct. 1950, p. 88-93.

Refers only to steels. Recommendations are given for standard AISI types, 19 of which are classified in 5 groups according to similarity of physical properties. Heat treatments are classified in 6 main groups, 3 quenching and 3 nonquenching.
(J general, ST)

226-J. The Carbonitriding Process of Case Hardening Steel. G. W. P. Rengstorff, M. B. Bever, and C. F. Floe. *American Society for Metals,* Preprint No. 1, 1950, 30 pages.

Samples of low carbon steel (SAE-1020) were carbonitrided under various conditions of temperature, time, and cooling; and standard specimens were tempered at different temperatures. Effects of variables were evaluated on the basis of surface hardness, depth hardness, microhardness, metallographic features, and case depth. 68 ref.
(J28, CN)

227-J. A Hardenability Test for Deep Hardening Steels. William Wilson, Jr. *American Society for Metals,*

Preprint No. 18, 1950. 20 pages.

Proposes new criterion of equivalent cooling conditions for correlation of hardenability tests with cooling curves measured during actual quenching. Test suitable for steels having an ideal diameter less than 21 in. Operational details and a correlation of the test with actual oil-quenching practice. Representative results with commercial alloy steels. (J26, Q29, AY)

228-J. An Examination of the Quenching Constant, H. D. J. Carney and A. D. Janulionis. *American Society for Metals,* Preprint No. 19, 1950, 14 pages.

Development of the above term. H values were calculated from cooling curves of various sizes of stainless steel bars quenched in water and oil. Variations in H appear to be due to variations in the surface heat-abstraction coefficient. 15 ref. (J26, SS)

229-J. The Tempering of Chromium Steels. R. W. Balluffi, Morris Cohen, and B. L. Averbach. *American Society for Metals,* Preprint No. 20, 1950, 21 pages.

The second, third, and fourth stages were studied by means of dilatometric, magnetic, and metallographic techniques used in conjunction with an electrolytic method for extraction of carbides. 22 ref. (J29, N8, AY)

230-J. Constitution of Carbonitrided Cases. G. W. P. Rengstorff, M. B. Bever, and C. F. Floe. *American Society for Metals,* Preprint No. 2, 1950, 21 pages.

Samples of low-carbon steel (SAE-1020) were carbonitrided under various conditions and some samples were also tempered. Carbon and nitrogen concentrations were studied as a function of depth, by chemical analysis. Structural constituents were investigated by X-ray diffraction. Amounts of retained austenite in various samples were determined by quantitative metallography using the lineal-analysis method. 24 ref. (J28, M22, N8, CN)

231-J. Improved Heating Furnaces. *Metal Progress,* v. 58, Oct. 1950, p. 490.

Slot-type heat treating furnaces of Dominion Forge & Stamping Co., Walkerville, Canada. Also improved refractory practice. (J general)

232-J. Automatic Casehardening of Small Stampings. Wasson C. Pfeiffer. *Machinery* (American), v. 57, Oct. 1950, p. 153-156.

Equipment and procedures of Burroughs Adding Machine Co., Detroit. (J28, ST)

233-J. Gas for the Nonferrous Industry. H. M. Heyn. *Industrial Gas,* v. 29, Oct. 1950, p. 9-11, 26-28.

Nonferrous gas-fired heating applications for the more important nonferrous metals that require thermal treatments during their production and processing. (J general, EG-a)

234-J. Kidde Installs Lithium Furnace To Improve Cylinder Quality. *Industrial Gas,* v. 29, Oct. 1950, p. 14-15.

Lithium-vapor heat treating furnace used in the manufacture of compressed gas cylinders. Its use eliminates surface scale by heat treating in a nonoxidizing atmosphere. (J general, ST)

235-J. Martensite Quenching and Annealing. (In French.) A. Michel. *Centre de Documentation Sidérurgique* (Paris), "Semaine d'Etudes de la Physique des Métaux", June 1948, p. 55-66.

A general review, including influence of individual factors. (J23, J26, N8, ST)

236-J. Quenching and Annealing of Light Alloys. (In French.) Paul Lacombe. *Centre de Documentation Sidérurgique* (Paris), "Semaine d'Etudes de la Physique des Métaux", June 1948, p. 75-89.

An experimental and theoretical study especially of structural hardening from the points of view of structure and its influence on mechanical properties. 31 ref. (J23, J26, M27, Al, Mg)

237-J. Industrial Aspects of the Quenching and Annealing of Light Alloys. (In French.) J. Hérenguel. *Centre de Documentation Sidérurgique* (Paris), "Semaine d'Etudes de la Physique des Métaux", June 1948, p. 91-99.

Influence of different factors such as annealing and quenching temperatures and times, alloy compositions, impurities, etc., on properties of alloys of practical importance. Refers only to Al-base alloys. (J23, J26, Al)

238-J. Selection of Optimum Conditions for High-Frequency Heat Treatment of Steel. (In Russian.) M. G. Lozinskii. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, July 1950, p. 13-16.

Fundamental nature of case hardening of steel by high-frequency currents. The influence of frequency on width of the zone heated by the induction method and of conditions of induction heating on character of heat distribution through the object were investigated. Derived formulas are interpreted graphically. (J2, ST)

239-J. Good Carburizing Practice. I. The Carburizing Process and Pack Carburizing Compounds. Application of Pack and Gas Carburizing. T. A. Frischman. *American Machinist,* v. 94, Oct. 16, 1950, p. 131-135; Oct. 30, 1950, p. 90-94.

Advantages and disadvantages of the process. (J28, ST)

240-J. Heat Treatment of Gears and Bands for Buick Dynaflow Transmission. Harold A. Maloney. *Industrial Heating,* v. 17, Oct. 1950, p. 1694-1696, 1698, 1700, 1702, 1704, 1864-1866.

Equipment and procedures. (J general, T21, ST)

241-J. Selection of Alloys for Dry Cyaniding and Gas Carburizing Applications. C. E. Wenger and G. C. McCormick. *Industrial Heating,* v. 17, Oct. 1950, p. 1751-1752, 1754.

Problems of selection, especially in the light of government allocations of nickel. (J28)

242-J. Carbon Restoration Improves Wear Resistance. Samuel Damon. *Steel,* v. 127, Oct. 23, 1950, p. 66-67.

How surface physical properties, including wear resistance and fatigue strength of steel parts decarburized by hot forming, can be greatly enhanced by recarburizing during heat treatment in a controlled atmosphere. (J28, ST)

243-J. Master Curves Simplify Stainless Tempering. A. E. Nehrenberg. *Steel,* v. 127, Oct. 23, 1950, p. 72-74, 76, 88.

Practical application of the curves is extended to the hardenable stainless steels, Types 410, 416, and 420, and to a number of common high-alloy hot work steels. A new chart eliminates mathematical computations formerly required. (J29, AY, TS, SS)

244-J. Combination Quenching Process. Glen A. Robinson. *Western Machinery and Steel World,* v. 41, Oct. 1950, p. 60-63.

See abstract of "Combustion Quench Reduces Aluminum Warpage", *Iron Age,* item 171-J, 1950. (J27, Al)

245-J. New Heat-Treating Furnace for Screw Machine Parts. *Western Machinery and Steel World,* v. 41, Oct. 1950, p. 70-71.

All-electric, semi-automatic pusher furnace with loading and quenching vestibules and accurately controlled atmosphere. (J26, CN)

246-J. Use of Oxy-Acetylene Process To Reduce Stress. Harry E. Kennedy. *Western Machinery and Steel World,* v. 41, Oct. 1950, p. 78-80.

Basic principles, mainly as applied to welding. (J2, K2)

247-J. Quench Controller for Steel. Walter K. Halstead and L. D. Jaffe. *Electronics,* v. 23, Nov. 1950, p. 109-111.

Apparatus in which improved control of quench time in cooling heat treated steel parts is obtained by taking advantage of the fact that hot steel is not ferromagnetic. The cooled part becomes magnetic and changes flux linkage between inductors so that an amplified signal actuates alarms. (J26, ST)

248-J. A Simple Method for Localized Annealing of Aluminum Sheet. *Modern Metals,* v. 6, Oct. 1950, p. 28.

Method using a neutral oxy-acetylene flame from a standard welding blow-pipe. (J2, Al)

249-J. Furnaces; the Pittsburgh Commercial Heat Treating Company. John C. McComb. *Steel Processing,* v. 36, Oct. 1950, p. 517-523.

Equipment and procedures. Includes facilities for brazing, electroplating, and other surface treatments. (J general, K8, L17)

250-J. Induction Machine Hardens Conveyor Wheels. *Steel Processing,* v. 36, Oct. 1950, p. 523-524. (J2, ST)

251-J. Gas Plays Important Part at Columbia's Sheet and Tin Mill. *Western Metals,* v. 8, Oct. 1950, p. 37-39.

Use of gas-fired furnaces for annealing and hot-dip or electrolytic tin plating or galvanizing. (J23, L16, L17, CN)

252-J. Two New Methods of Hardening and Surface Restraining by Carbonitriding of Steel Parts. (In French.) Jacques Pomey, Francois Goutel, André Veragen, and René Le Roux. *Comptes Rendus* (France), v. 231, July 10, 1950, p. 148-150.

Methods in which the parts are held between the A_3 temperature of the eutectoid Fe-C and the lowest temperatures of reversible equilibrium of Fe-C-N alloys. (J28, ST)

253-J. Transition Phenomena of Hardening by Dissolution. (In French.) Francis Aubertin and Charles Crussard. *Comptes Rendus* (France), v. 231, July 31, 1950, p. 353-354.

The phenomenon was investigated by a thermo-electric method on impure Al (0.14% Fe, 0.012% Cu, 0.06% Si) and an Al-Mg alloy (12% Mg). Possible causes are tentatively explained. Suggests designation of such phenomena as "structural hardening by dissolution" for differentiation from the normal increase in hardness caused by enrichment of a homogeneous solid solution. (J27, N7, Al)

254-J. Short-Time Annealing. (In Czech.) Milos Spevak. *Hutnické Listy,* v. 5, July 1950, p. 274-277.

Results of a study of effects of various cold working and annealing factors on recrystallization of a 6% Sn bronze. (J23, N5, Cu)

255-J. Selective Hardening Enables Machine Speedup. Douglas Godby. *Iron Age,* v. 166, Nov. 2, 1950, p. 93-94.

From overall hardening prior to machining, Buick changed to induction heating only where needed on a transmission part. The change raised production by permitting use of higher machining speeds. (J26, J2, G17, ST)

256-J. Heat Treatments; Their Selection and Specification in Design. Part 2. Hardness. Norman N. Brown. *Machine Design,* v. 22, Nov. 1950, p. 115-119.

The various treatments and their applicabilities. Recommendations. (J general)

257-J. Radivection — Equated Heating. Al. W. Davis. *Metal Treating,* Sept. 1950, p. 4-6, 14.

Improved heat treating furnace design for use at 250-1750° F. Use of a new system of heat transfer results in improved temperature uniformity during both stages of treatment. Economy in operation and increased production are achieved by use of combined radiation and convection heating. (J general)

258-J. New Quenching Process for Aluminum. Gilbert Close. *Light Metal Age,* v. 8, Oct. 1950, p. 6-7, 20.

Combination fog-water quenching process for heat treatable Al alloy sheet stock which is proving highly practical in reducing quench warpage and minimizing subsequent straightening operations. (J26, Al)

259-J. Electronic Control of Production Flamatic Hardening. Milton Garvin and David Strauchen. *Welding Journal,* v. 29, Nov. 1950, p. 981-985.

New developments in production flame hardening of parts, including electronic temperature control of the surface and depth control of hardening. (J2)

260-J. Use of Oxyacetylene Process To Reduce Stress. Harry E. Kennedy. *Welding Journal,* v. 29, Nov. 1950, p. 985-988.

Residual stresses and conditions under which they may become dangerous, as well as methods for relieving them. (J1, J2)

261-J. Surface Hardening Vs. Fatigue in Steel. J. M. Berry and H. J. Grover. *Industrial Gas,* v. 29, Nov. 1950, p. 10-11, 25.

Test results indicate that surface hardening by means of high-speed heating raises notch-fatigue strength. Effects of induction hardening were compared with those of high-speed gas heating. Both treatments restored the fatigue strength present before notching. (J26, J2, ST)

262-J. Principles of Heat Treatment. J. S. Vatchagandhy. *Transactions of the Indian Institute of Metals,* v. 3, 1949, p. 23-47; discussion, p. 47-50.

Comprehensive survey of fundamental and practical aspects, mainly as applied to steels. 14 ref. (J general, N8, ST)

263-J. Quenching of Steels. U. V. Bhat. *Transactions of the Indian Institute of Metals,* v. 3, 1949, p. 51-81; discussion, p. 81-84.

Comprehensive survey, including experimental methods; effects of size and shape on cooling in different media; comparison of different coolants; and relation of cooling rates and depth-hardening properties of steels. 14 ref. (J26, ST)

264-J. Hardenability of Steels. Vijay G. Paranjpe. *Transactions of the Indian Institute of Metals,* v. 3, 1949, p. 85-110.

The hardenability concept, determination of hardenability, factors affecting hardenability, calculation of hardenability, and selection and specification of steel. 53 ref. (J26, ST)

265-J. Uncertainties in Influence of Alloys on Hardenability. M. A. Grossmann. *Transactions of the Indian Institute of Metals,* v. 3, 1949, p. 111-127; discussion, p. 127-129.

Present status of information in regard to the quantitative effects of alloys on the hardenability of steel, indicating unsolved problems. 22 ref. (J26, ST)

266-J. Tempering of High Carbon Steels. E. G. Ramachandran and Dara P. Antia. *Transactions of the Indian Institute of Metals,* v. 3, 1949, p. 131-142; discussion, p. 142-145.

Transformations and hardness changes which occur during tempering. 12 ref. (J29, N8, CN)

267-J. Heat Treatment of Two Commercial Tool Steels. S. Visvanathan. *Transactions of the Indian Institute of Metals,* v. 3, 1949, p. 147-162; discussion, p. 162-164.

As applied to two types of shallow hardening toolsteels: coinage die steels and tap steels. Compositions and applications of several types of each. (J general, TS)

268-J. Heat Treatment of High Speed Steels. P. H. Tata and K. N. P. Rao. *Transactions of the Indian Institute of Metals,* v. 3, 1949, p. 165-179; discussion, p. 179-183.

The fundamental changes which take place and deviations from conventional practice. Does not discuss

commercial heat treating equipment or practical aspects of procedure. Considers mainly the 18-4-1 W-Cr-V type with some reference to 6-6-2 Mo-W-V and 5-18-4-1 Co-W-Cr-V types. (J general, N8, TS)

269-J. Comparison of Gas and Bath-Nitriding. H. Schrader. *Transactions of the Indian Institute of Metals,* v. 3, 1949, p. 185-225; discussion, p. 225-227.

Loss in core ductility of the various types of constructional steels during nitriding and influence of alloy additions upon their nitridability. Factors influencing toughness of the nitrided layer were examined using different test methods. The most useful application of both nitriding methods. 44 ref. (J28, CN)

270-J. Equipment for the Heat Treatment of Steel. R. A. P. Misra. *Transactions of the Indian Institute of Metals,* v. 3, 1949, p. 253-278.

An illustrated survey. (J general, ST)

271-J. Quick Estimation of Case Depth. Marie H. Whitehill. *Metal Progress,* v. 58, Nov. 1950, p. 735.

Simple technique which does not require mounting in bakelite. (J28)

272-J. Cementation by Carbon and Nitrogen. (In French.) J. Pomey. *Revue de Métallurgie,* v. 47, Sept. 1950, p. 637-657.

Carburizing, nitriding, and the combined process — carbonitriding — as applied to steel. Results of a comprehensive theoretical and experimental study. The three phases of the cementation reaction are analyzed: chemical reaction of the atmosphere with the metal surface at high temperature; simultaneous diffusion into the austenitic surface layers; and heat treatment involving quench hardening of the surface layer. (To be continued.) (J28, ST)

273-J. Evolution in the Design of Electric Furnaces. (In French.) F. Barbas. *Métaux et Industries,* v. 1, No. 1, 1950, p. 24-32.

Reviews progress, particularly from the point of view of gas tightness, permitting heat treatment in different atmospheres. (J2)

274-J. Induction Heat Treatment of Welds. (In Russian.) V. V. Alexandrov and T. A. Vashurova. *Promyshlennaya Energetika* (Industrial Power), v. 7, Aug. 1950, p. 13-15.

Possibility of induction heating welds with high rates of heating and without holding at the heat treatment temperature. Butt welded carbon steel plates (0.17-0.27% C) and butt welded pipe sections of Mo steel were investigated. (J2, CN, AY)

275-J. Good Carburizing Practice. III. Production of Carburizing and Carrier Gases. T. A. Frischman. *American Machinist,* v. 94, Nov. 27, 1950, p. 104-107.

Operation of gas generators and furnaces to obtain the desired properties. (J2)

276-J. Hot Oil Quenching Reduces Distortion in Hardening of Steel Parts. Kenneth Rose. *Materials & Methods,* v. 32, Nov. 1950, p. 62-64.

New isothermal heat treating procedure, called marquenching, which produces more uniform hardness, reduces residual stresses, and almost entirely eliminates warpage. Comparative photomicrographs. (J26, ST)

277-J. Controlling Hardness and Microstructure During Induction Hardening. G. A. Warwick. *General Electric Review,* v. 53, Nov. 1950, p. 21-26.

Fundamental principles. Semi-automatic fixture designed and built to evaluate the merit of a method by which temperature rather than time is the criterion for duration of the heating cycle. Material studied was AISI C-1151 steel. Graphs show effect of surface temperature on hardness penetration at different power densities, case depth vs. surface temperature at different power densities, surface temperature vs. case composition, and calculated heat-flow characteristics for induction heating. (J2, ST)

278-J. The Skills Born of Specialization Solve Another Problem. Arthur E. Fulton. *Metal Treating,* v. 1, Nov. 1950, p. 4-5.

Procedure developed by J. W. Rex Co., Lansdale, Pa., for case hardening of C-1118 steel crankshafts for compressor units. (J28, CN)

279-J. Rectification of Neutral Salt Baths Operating at High Temperatures. Stewart M. De Poy. *Metal Treating,* v. 1, Nov. 1950, p. 12-16.

Three test runs were made on a neutral salt bath operating at high temperatures to determine a process for eliminating oxides from the bath. One bath was rectified with silica, one with a graphite rod inserted wholly below the surface of the bath, and one was operated without a rectifier. Results proved that rectification with a graphite rod practically eliminates decarburization of the work passing through the bath. Elimination of the oxides also prolongs electrode life. (J2)

280-J. A Practical Consideration of the Heating of Carbon Steel Rod and Wire in the Patenting Process. Walter R. Bloxdorf. *Wire and Wire*

Products, v. 25, Nov. 1950, p. 965-969, 1002-1004.

Quantitative results of experiences. Improvement of the patenting of wire for use in the manufacture of wire rope. (J25, CN)

281-J. Industrial Gas Makes Metals. Arthur Q. Smith. *Canadian Metals,* v. 13, Nov. 1950, p. 8-9, 51.

Gas utilization in foundry practice, fabricating, and heat treating. (J general, E general)

282-J. Using Oxyacetylene to Reduce Stress. Harry E. Kennedy. *Canadian Metals,* v. 13, Nov. 1950, p. 36-38.

Torch heating for stress relief of welds. (J1)

283-J. Moulded Refractory Burners and Tunnels for Industrial Purposes. W. N. Smirles. *Ceramics,* v. 2, Oct. 1950, p. 427-430.

Calculations and experiments made in design. Performance data. Industrial applications to brazing, local annealing and hardening, and edge fusion of glassware. (J general, K8)

284-J. The Anomalous Cementation Behavior of Steel. (In German.) Wilhelm Anton Fischer and Walter Koch. *Archiv für das Eisenhüttenwesen,* v. 21, Sept.-Oct. 1950, p. 345-354.

Soft-iron melts were made in basic and acid high-frequency furnaces and treated with specific deoxidants. Mn, Si, and Al contents were systematically varied and specimens were tested for sensitivity to aging and cementation behavior. Oxide inclusions were electrochemically isolated. It was found that there is a positive correlation between cementation behavior and composition of the oxide inclusions. 14 ref. (J28, CN)

285-J. The Quench Hardenability of Steels and Their Testing. (In German.) Hermann Schottky. *Stahl und Eisen,* v. 70, Oct. 12, 1950, p. 909-925.

Reviews literature. Discusses the theory that it is more important to determine hardness depth in relation to grain size rather than hardness itself. Considerable attention to the work of Jominy and of Grossmann. 93 ref. (J26, ST)

286-J. Forging Ahead at Utica; Precision Controls Speed Precision Forging of Jet Engine Parts. Warren Walker, Jr. *Industrial Heating,* v. 17, Nov. 1950, p. 1920-1922, 1924, 1926.

Equipment and procedures of Utica Drop Forge & Tool Corp. Emphasizes heat treating and forging operations. (J general, F22, SG-h)

287-J. Salt Quench of Steel Parts Gives Uniform Hardness at Utah Plant. James Joseph. *Western Metals,* v. 8, Nov. 1950, p. 30-31.

Procedures and equipment of Eimco Corp., Salt Lake City. Large Cr-Mo steel parts used in the production of mining and construction machinery are successfully heat treated. (J2, AY)

288-J. Nodular Cast Iron; Heat Treatment and Physical Properties. Robert Y. Scapple. *Iron and Steel,* v. 23, Sept.-Nov. 1950, p. 379-382.

Results of experiments on effects of heat treatment on physical properties. Prior to heat treating, a study was made to determine how the combined carbon varied with temperature and time; what hardness can be expected; how microstructure varies with time and temperature; and the hardenability of nodular cast iron. (J26, Q general, M27, CI)

289-J. High-Speed Steel; Some Developments in Heat Treatments. H. Carr. *Iron and Steel,* v. 23, Sept.-Nov. 1950, p. 383-388.

Reviews and correlates recent work reported in the literature. 16 ref. (J general, TS)

290-J. Blanking Dies; Heat Treatment of High-Carbon, High-Chromium Steels. J. R. Bryant. *Iron and Steel,* v. 23, Sept.-Nov. 1950, p. 411-413.

Experiments on effect of tempering temperature, decarburization, effect of soaking time at the hardening temperature, and initial treatment vs. final hardness. (J general, TS)

291-J. Heat Treatments; Their Selection and Specification in Design. Part 3. Combination Hardness and Toughness. Norman N. Brown. *Machine Design,* v. 22, Dec. 1950, p. 137-142.

Heat treatments suitable for developing various desired combinations of hardness and toughness. Applicable to carbon and alloy steels. (J general, Q23, Q29, CN, AY)

292-J. Good Carburizing Practice. IV. Gas Carburizing Requires Close Control. T. A. Frischman. *American Machinist,* v. 94, Dec. 11, 1950, p. 138-141.

Control of the gas carburizing process requires attention to gas distribution within the furnace, gas pressure, temperature, work loading, gas analysis, and dewpoint. Recommended procedures. (To be continued.) (J28)

293-J. Anneal Ductile Iron for Better Machinability. J. F. Kahles and R. Goldhoff. *Iron Age,* v. 166, Dec. 14, 1950, p. 105-108.

How adequate machinability and mechanical properties can be ob-

tained in ductile iron without complete pearlite decomposition. Increased Si content speeds carbide solution, while pearlite decomposition is mainly a function of Mn content. Small amounts of carbide can be tolerated if the matrix is basically ferrite. (J23, G17, CI)

294-J. Patenting Furnace Features Lightweight Construction. W. R. Bloxdorf and A. M. Naysmith. *Iron Age,* v. 166, Dec. 14, 1950, p. 112-113.

Increased fuel economy and reduced operating costs are achieved by proper design, coupled with use of light-weight insulating firebrick. (J25, ST)

295-J. Some Notes on the Hardening and Heat Treatment of Steel. G. H. Jackson. *Machinery Lloyd* (Overseas Edition), v. 22, Nov. 25, 1950, p. 68-73, 75, 77. (A condensation).

The Fe-C equilibrium diagram; metallographic considerations; alloying elements; methods of heat treatment; isothermal hardening; high-frequency heat treatment; and subzero treatment. 14 ref.
(J general, M24, N8, ST)

296-J. Progress in Heat Treatment in the Last Twenty-One Years. P. F. Hancock. *Metallurgia,* v. 42, Nov. 1950, p. 329-333.

An illustrated review of equipment and procedures. (J general)

297-J. Methods of Improving the Quality of Autogenous Welding Rods. (In French and German.) C. G. Keel. *Zeitschrift für Schweisstechnik; Journal de la Soudure,* v. 40, Sept. 1950, p. 151-154; Nov. 1950, p. 201-205.

Shows that welds in steel subsequently torch heat treated usually have a higher notch-impact strength than welds not treated in this manner; also that high Si, Mn, and S contents reduce impact strength and effect of the torch normalizing treatment. (J2, K2, CN)

298-J. (Book) **Härterei-Technische Mitteilungen. Bd. 4.** (Technical-Hardening Symposium, Vol. 4.) R. Riebensahm, editor. 164 pages. 1950. Carl Hanser Verlag, Munich 27, Germany. 19.50 DM.

Nine papers delivered at the 4th "Hardening Colloquium at Bremen and Stuttgart. They may be divided into four groups: basic problems of hardening, heat treating and annealing; practical problems of heat treatment; results of studies on the specific behavior of a steel during different heat treating processes; and problems connected with strength determinations.
(J general, ST)

SECTION K

JOINING

1K. Copper Paste Simplifies Brazing on Aer-a-sol Bombs. Karl Wunsch. *Iron Age,* v. 164, Dec. 22, 1949, p. 76-77.

Copper in paste form replaces copper-wire rings. The paste is applied by a gun that deposits it on the part in the form of a ribbon. (K8)

2K. How To Take the "Ifs" Out of Aluminum Welding. *Steel,* v. 125, Dec. 26, 1949, p. 46-48, 56.

Recommendations for more effective shop practice prepared by the Resistance Welding Institute to clear up difficulties encountered in welding aluminum surfaces. (K3, Al)

3K. Phototube Controls R-F Welding. Hubert H. Wittenberg. *Electronics,* v. 23, Jan. 1950, p. 91-93.

In manufacture of picture tubes, a vacuum-tight weld is required in the exhaust tubulation assembly to join copper tubing to a sealing sleeve of Ni-Cr-Fe alloy. Precise automatic control of welding is provided by a phototube that monitors the weld temperature and shuts off the generator ½ sec. after the copper flows. The technique is said to be applicable to other manufacturing processes. (K6, Cu, AY)

4K. Industrial Brazing by Pulse Techniques. J. L. Reinartz. *Electronics,* v. 23, Jan. 1950, p. 78-80.

How extremely high values of peak r.f. power are applied in short-duration pulses to reduce heating by thermal conduction of parts adjacent to or near joint being brazed. System developed for tube manufacture has interesting possibilities for other applications. (K8)

5K. Welded Construction Cuts Broach Cost. J. A. Smithers. *American Machinist,* v. 93, Dec. 29, 1949, p. 65.

40-ton vertical surface broach for machining diesel-locomotive parts. Comparative costs of casting and welding ($5780 and $3000). (K general, T5)

6K. Fast Process Welds Aluminum Without Heating. *Modern Metals,* v. 5, Dec. 1949, p. 28-29.

"Koldweld" process developed by General Electric Co., Ltd., in England. It is also applicable to Mg, Cu, Ag, Zn, and other nonferrous metals. (K5, Al)

7K. The Low Hydrogen Type Electrode. J. H. Humberstone. *Canadian Metals and Metallurgical Industries,* v. 12, Dec. 1949, p. 16-19. Reprinted from *Welding Arcs.*

Advantages of this development. Typical results. (K1, T5)

8K. Some Anomalies in the Weldability of High-Tensile Steels. A. J. Elliott and W. I. Pumphrey. *Journal of the Iron and Steel Institute,* v. 163, Dec. 1949, p. 369-377.

Examination of plates rolled from 16 different 1½% Cr-Mo steel castings, of similar chemical composition but different furnace origin, suggests that the steelmaking process may have a considerable influence on weldability. In particular, the results indicate that the weldability of the basic electric steels is superior to that of the basic openhearth steels. (K9, CI)

9K. Joining and Welding. *Steel,* v. 126, Jan. 2, 1950, p. 179-183.

Brief reviews and forecasts: New Metallic-Arc Process Efficiently Welds Stainless, Frank Aschenbrenner. High Frequency Pipe Welding—Outstanding Development, G. N. Sieger. Cold Welding Nonferrous Metals Gets Attention, Robert E. Kinkead. Structural Work Improved With High Tensile Bolts, Herman H. Lind. Brazing Gives Designers Versatile Manufacturing Tool, N. M. Salkover. Structural Welding Applications Seen Gaining, Lamotte Grover. "Slope

Control" Permits Accurate Current Regulation, J. T. Bailey. Inert-Gas-Shielded Arc Process Aids Auto Makers, F. J. Pilia. Sees Greater Use of Arc Welding This Year, C. I. MacGuffie. Powder Cutting Improvements Cut Costs by 50 Per Cent, E. M. Holub. Changeover Seen in Wire Drawing and Extrusion Dies, Wm. G. Waltermire. Arc Welding To Make Even Greater Progress in Future, A. F. Davis. Use of Silver Brazing Alloys Being Widened, A. M. Setapen. Two Aluminum Welding Methods May Help Cut Costs, G. O. Hoglund. Argon Metal Arc Welding Boosts Aluminum Fabrication, H. T. Herbst. Quality Control in Welding Must not Relax—but Advance, R. B. Lincoln. Up-to-Date Data on Welding Design Needed, A. P. Young. Higher Speeds, Lower Costs Trend in Arc Welding, C. H. Jennings. AC Current May Provide Better Copper Weldments, J. R. Hunter. Great Future Seen for Electric Arc Welding, Pierre Champion. Inert-Gas Shielded Welding Applications Increasing, H. A. Huff, Jr. General Usage—Aim of Current Welding Refinements, E. R. Behnke. Ultrasonic Unit Facilitates Flash Butt Weld Cycles, I. A. Oehler. Heavy Demand for Fasteners to Continue This Year, George A. Tinnerman. (K general)

10K. Beater-Blade Assemblies for Portable Mixers Brazed Economically in Electronic Induction Heater. *Industrial Heating,* v. 16, Dec. 1949, p. 2148, 2150.
(K8)

11K. Fusion Welded Pressure Vessels. *Industrial Chemist and Chemical Manufacturer,* v. 25, Dec. 1949, p. 547-553.
Provisional British Standard Code for vessels for the chemical and allied industries. It represents a major departure from previously established practice and should lead to marked economies in the use of steel. (K general, T26, S22)

12K. Siphon for Soap Lake. *Welding Engineer,* v. 35, Jan. 1950, p. 17.
Construction of 22-ft. diam. liners for concrete siphon pipe. Steel plates were rolled to the proper curvature and joined by submerged-melt welding. (K1)

13K. Welding Jet Aircraft Engines. Frank G. Harkins. *Welding Engineer,* v. 35, Jan. 1950, p. 18-21.
Precision welding of high-temperature aircraft components involves practically all processes, including induction brazing, inert-arc welding, submerged-arc welding, and resistance-welding. Equipment and procedures of Solar Aircraft Co.
(K general, T24)

14K. Bus Cylinder Block Repaired by Welding. Frank Gianelli. *Welding Engineer,* v. 35, Jan. 1950, p. 24-25.
(K general, T21)

15K. New Subway Cars for New York City. *Welding Engineer,* v. 35, Jan. 1950, p. 26-27, 31.
Welding, finishing, and assembly operations. (K general, T23)

16K. Weldments vs. Castings. Lawrence Naberhaus. *Welding Engineer,* v. 35, Jan. 1950, p. 28-31.
Cost comparisons for several parts produced as a weldment and as a cast-iron structure, in lots of 1, 10, and 50. (K general, E general)

17K. Brazed Joints for Mine Rails. *Welding Engineer,* v. 35, Jan. 1950, p. 32-33.
Equipment and procedures. (K8)

18K. Design Considerations in Resistance Welding. I. *Welding Engineer,* v. 35, Jan. 1950, p. 34-36.
General recommendations. (To be continued.) (K3)

19K. Welded Aluminum Trailer. R. E. Ferris. *Welding Engineer,* v. 35, Jan. 1950, p. 37.
An inert-arc holder mounted on a traveling carriage is used for production welding of trailer roofs from 3S-HH aluminum sheet.
(K1, T21, A1)

20K. How To Weld "White Metal". Roland H. Ogden. *Welding Engineer,* v. 35, Jan. 1950, p. 38-40, 42. A condensation.
"White metal" is another name for the Zn-base alloys used to make die castings. Contrary to the opinion of many welders, a broken die casting can be welded, and have the same strength as before. Procedure.
(K general, Zn)

21K. Man-Hour and Material Savings Effected by Resistance Welding Jet Engine Components. *Steel,* v. 126, Jan. 9, 1950, p. 58, 61.
Equipment and procedures for joining like and unlike metals.
(K3, T25)

22K. Tricky Techniques Help Resistance Welders. Wallace A. Stanley. *American Machinist,* v. 94, Jan. 9, 1950, p. 96-100.
Time and money saving tricks to keep resistance-welding equipment operating at top efficiency. (K3)

23K. Another "Impossible" Repair Saves $16,000. Leon Mason. *Industry & Welding,* v. 23, Jan. 1950, p. 12-14, 16.
Procedures used for repair of a 3000-ton hydraulic press.
(K general, T5)

24K. Welding—America's Leading Maintenance Tool. *Industry & Welding,* v. 23, Jan. 1950, p. 18-22, 24.

Miscellaneous applications. (K general)

25K. Quick Repairs Avert Shutdowns. *Industry & Welding,* v. 23, Jan. 1950, p. 32-34.

Repair of cracked gas-compressor water jackets. (K general)

26K. Chain Block Salvaged by Bronze Welding. *Industry & Welding,* v. 23, Jan. 1950, p. 41. (K8)

27K. Resistance-Welding Machine and Power Supply. C. E. Smith. *Transactions of the American Institute of Electrical Engineers,* v. 67, Part II, 1948, p. 995-1003; discussion, p. 1003-1004.

Previously abstracted from *Electrical Engineering.* See item 22a-194, 1948. (K3)

28K. Instrumentation for the Evaluation of the Stability of the Welding Arc. Lauriston P. Winsor, L. McDonald Schetky, and Robert A. Wyant. *Transactions of the American Institute of Electrical Engineers,* v. 68, 1949, p. 525-533.

Previously abstracted from *Electrical Engineering.* See item 22A-229, 1949. (K1)

29K. Stability and Design of Welded Structures of Steel A-52. (In French.) Lucien J. Vandeperre and Alexandre Sariban. *Revue de la Soudure; Lastijdschrift,* v. 5, no. 2, 1949, p. 66-86; no. 3, 1949, p. 148-172.

Results of a comprehensive investigation indicate that, for determination of structural parameters of a welded framework, the same parameters applicable to riveted structures may be used, by adding 13%—said to be the maximum possible difference in stability between these two types of structures. (K general, ST)

30K. Welding of Rails and Resistance to Fatigue of the Welds. (In French.) M. P. Hustin and W. Soete. *Revue de la Soudure; Lastijdschrift,* v. 5, no. 2, 1949, p. 87-105.

Results of experimental investigation applied to welds made by a wide variety of methods. Data show, generally, lower fatigue strength than that indicated by the literature. 14 ref. (K general, Q7)

31K. Riveting of Light Alloys. (In Italian.) *Alluminio,* v. 18, July-Aug. 1949, p. 413-435.

Equipment and procedures. Selection of rivet materials, rivet design, determination of optimum spacing and size of rivets for different situations. Diagrams and descriptions of riveting guns. (K13, Al)

32K. Welding or Hard Soldering. (In German.) J. Kunz. *Schweissen und Schneiden,* v. 1, Oct. 1949, p. 163-170.

The various soldering processes. Metallurgical structures of soldered and welded joints and their relative strength properties. Specific uses of each of the two processes. 11 ref. (K7)

33K. Investigation of the Strength of Welded Aluminum-Alloy Sheets by Means of Tensile and Fatigue Testing. (In German.) O. Graf. *Schweissen und Schneiden,* v. 1, Nov. 1949, p. 183-189.

Results show that gas welded specimens have considerably higher tensile and fatigue strength than the arc welded ones. (K1, K2, Q23)

34K. Gas Welding of Thin Al-Mg Sheets. (In German.) Friedrich Erdmann-Jesnitzer. *Zeitschrift für Metallkunde,* v. 40, Oct. 1949, p. 389-397.

Experiments with different Al-Mg alloys show that a low-Si alloy is most desirable from the standpoint of strength and malleability as well as weldability. (K2, Al, Mg)

35K. Welding Thin Rust and Acid Resistant Sheets. (In German.) W. Hummitzsch and A. Schmidt. *Schweisstechnik,* v. 3, Sept. 1949, p. 97-99.

An automatic welding process and an electrode steel (0.10% C, 19.0% Cr, 9.0% Ni, 2.5% Mo, and 0.8% Cb) especially developed for this purpose. The resulting weld is said to be perfectly uniform and equal in strength to the sheet material. (K1, SG-g)

36K. Influence of Microstructure Under the Notch on Impact Strength of Test-Sections. (In Russian.) A. E. Asnis and B. I. Medovar. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Sept. 1949, p. 1102-1103.

The above was investigated with respect to weldability of clad steel (low-carbon steel clad with a thin layer of Cr-Ni stainless steel). It was found that the structure underneath the notch has a decisive influence on impact strength of the section. (K9, Q6)

37K. Welding High-Nickel Alloys To Other Metals. G. R. Pease and H. B. Bott. *Welding Journal,* v. 29, Jan. 1950, p. 19-26; discussion, p. 26.

Over 70 metallic-arc welded butt joints were prepared and examined for strength and ductility. They included welds joining monel, Inconel, and commercial nickel to each other, and to several other engineering alloys, including mild steel, 18-8

stainless in four composition ranges, 70-30 cupro-nickel, silicon bronze, and Hastelloy "B". Safest choice of electrodes. (K1, Ni)

38K. Inert-Gas-Shielded Arc-Welding Aluminum Pressure Vessels. A. J. Hopper. *Welding Journal,* v. 29, Jan. 1950, p. 31-35.

Diagrams show weld-groove preparation and weld design. Recommendations with regard to materials, layout and assembly, and preheating. Welding of tube sheets to barrels. (K1, T26, Al)

39K. Shielded Stud Welding of Aluminum Alloys. Edward Dash. *Welding Journal,* v. 29, Jan. 1950, p. 35-36.

History of development of the process, some details of equipment, possible applications. (K1, Al)

40K. Arc Welding of Molybdenum. I. S. Goodman. *Welding Journal,* v. 29, Jan. 1950, p. 37-44.

Submerged arc (or melt) welding offers the best potentialities for sound joints. Inert-gas shielded-arc welding and atomic-hydrogen welding are discussed briefly. Present techniques limit their use to sections less than ¼ in. thick. (K1, Mo)

41K. Welding Metallurgy—Iron and Steel. Chapter 5. The Structure of Metals. O. H. Henry, G. E. Claussen, and G. E. Linnert. *Welding Journal,* v. 29, Jan. 1950, p. 45-50.

Reprinted from 2nd edition of book. See item 22B-217. (K general, M general, Fe)

42K. More Jobs Repaired by Bronze Welding. W. M. White. *Welding Journal,* v. 29, Jan. 1950, p. 52-53.

Some typical bronze-welded repair jobs. (K8)

43K. Welding High-Carbon Steel. Mark W. Sterner. *Welding Journal,* v. 29, Jan. 1950, p. 54-55.

Adaptation of the manual hidden-arc welding process to fabrication of certain small, nonuniform, high-carbon steel parts. (K1, CN)

44K. Welding Heavy Castings Restores Power Truck Damaged by 150% Overload. J. A. Draxler. *Welding Journal,* v. 29, Jan. 1950, p. 55-56.

Weld repair of platform-support arms broken off by the heavy load. They are Cr-Mo steel castings. (K general, CI)

45K. Spot Welding Nickel and Nickel Alloys. Frank G. Harkins. *Welding Journal,* v. 29, Jan. 1950, p. 3S-12S.

Study of weldability of various Ni alloys in dissimilar metal combinations indicates that spot welding can be successful. Material combinations which appear to be metallurgically incompatible with each other, such as monel + mild steel. Tentative welding schedules for the various metal combinations. (K3, Ni)

46K. Electrodes for Spot Welding Galvanized Steel. Harry B. Spore. *Welding Journal,* v. 29, Jan. 1950, p. 31S-36S.

Influence of electrode shape and material on weld characteristics. Appropriate machine settings for each tip shape. (K3)

47K. Welding Galvanized Iron. *Linde Tips and Oxy-Acetylene Tips,* v. 29, Jan. 1950, p. 21.

Technique. (K general)

48K. Redesign for Projection Welding Cuts Assembly Costs. *Product Engineering,* v. 21, Jan. 1950, p. 100.

Projection welding the drip pan of the Sharples centrifuge. Although a minor part of the apparatus, changes resulted in savings of $860 for every 1000 units produced. (K3)

49K. Glass-to-Metal Seals. Joseph A. Pask. *Product Engineering,* v. 21, Jan. 1950, p. 129-134.

Design criteria for vacuum-tight seals between glass and metal; physical and chemical characteristics of common glasses and metals; and seals, sealing techniques, and procedures for various applications. 14 ref. (K11)

50K. Design Details for Stud Welding. R. W. Murdock. *Product Engineering,* v. 21, Jan. 1950, p. 135-140.

Minimum plate thicknesses for different sizes of studs; strength of studs; required clearances for the welding gun; methods of stud location; and basic functional advantages of the process. (K1)

51K. New Techniques for Lining Vessels for Protection Against Corrosion. G. C. Carpenter. *Petroleum Processing,* v. 5, Jan. 1950, p. 21-25.

Experiments on methods for applying corrosion resistant liners to refinery vessels. Development of a new stud-welding technique. Plug welding was discontinued in practice and various types of strip welding are now used. Selection of liner materials. (K1, T29)

52K. Notes on the Weldability and Mechanical Properties of Manganese-Vanadium Plate Steel. Part 2. T. W. Merrill. *Vancoram Review,* v. 6, no. 2, 1949, p. 7-9, 19.

Results obtained with the Lincolnweld automatic arc welding machine. Mechanical test data. (K9, AY)

53K. The Evaluation of Chromium-Iron Alloys for Metal Kinescope Cones. Arnold S. Rose and John C. Turnbull. *RCA Review,* v. 10, Dec. 1949, p. 593-599.

A series of tests on alloys containing 17 and 28% Cr which estab-

lishes their suitability for sealing to the glasses used in the manufacture of metal-cone kinescopes. These tests were based upon behavior of the alloy during heating to the sealing temperature of 1200° and include microscopic examination of structure, a thermal expansion test, and a seal test. (K11, P11, T8, SS)

54K. Strap Type Welding Fixture. Clement F. Brown. *Tool Engineer,* v. 24, Jan. 1950, p. 36.

Set-up for welding seven steel clips to a curved cast steel member. (K general, CI)

55K. Bimetallic Bonding Gives New Parts Design Possibilities. *SAE Journal,* v. 58, Jan. 1950, p. 32-35. Based on "The Uses of Bonded Bimetallic Components in Modern Automotive Structure and Engine Design" by Charles E. Stevens, Jr.

Aluminum-cast iron combination for bimetallic pistons, gears, bearings, and light-weight housing castings and better performing brake drums. Other combinations discussed are pistons of Alcoa 132A (Lo-Ex) alloy with a Ni-resist insert; and steel-backed Al bearings. (K5, Al, CI)

56K. Today's Pipe Welding Practice. F. C. Fantz. *Heating, Piping & Air Conditioning,* v. 22, Jan. 1950, p. 124-127, 131.

(K general, T27)

57K. Hot Riveting and Upsetting by Electrical Methods. M. Stuart. *Machinery Lloyd* (Overseas Edition), v. 21, Dec. 17, 1949, p. 94-97.

Potential advantages over other methods such as mechanical riveting, copper brazing, and resistance welding. (K13)

58K. Resin-Cored Solders; Performance Test for Plain and Activated Flux Cores. G. L. J. Bailey and H. C. Watkins. *Metal Industry,* v. 75, Dec. 30, 1949, p. 551-554.

Apparatus designed to provide a simple means of distinguishing, by their performance in a soldering test, between plain and activated resin cores. Examples illustrate possible applications. (K7)

59K. Contribution to Study of the Quality of Spot Welds. (In French.) R. Biais. *Soudure et Techniques Connexes,* v. 3, Sept.-Oct. 1949, p. 189-202.

A new method for control of the quality of spot welds in semi-hard steel is characterized by application of torsion to flat spot-welded test specimens. (K3, K9, ST)

60K. Possibility of Application of Different Test Methods to Welded Structures. (In French.) A. Leroy. *Soudure et Techniques Connexes,* v. 3, Sept.-Oct. 1949, p. 203-214.

Reviews different test methods, such as destructive, semi-destructive, nondestructive, and X-ray and γ-ray investigation. Applications of each. (K9)

61K. An Example of Construction of a Gas Holder Using Double-Seam Welding. (In French.) R. Guéroux. *Soudure et Techniques Connexes,* v. 3, Sept.-Oct. 1949, p. 217-222.

A series of drawings and photographs indicates each step of the work. Includes cost analysis. (K3, T26)

62K. Mechanism of Crystallization of Welds During Fusion Welding. (In Russian.) A. A. Slov. *Avtogennoe Delo* (Welding), Sept. 1949, p. 1-3.

Welding with bare and with thickly coated electrodes and automatic welding under a layer of flux. Under the action of mechanical forces, the molten metal arranges itself in the form of waves. This wave motion and crystallization of the metal results in a lamellar structure on the surface of the weld and lines inside the weld metal. Both the welding process and properties of the coated electrodes and fluxes influence the character and frequency of the waves. (K1, N12)

63K. Automatic Welding With a Shielded Arc at High Current Densities. (In Russian.) V. P. Demyantsevich and I. A. Blokh. *Avtogennoe Delo* (Welding), Sept. 1949, p. 3-6.

When rate of electrode travel corresponds to rate of fusion, current density may be greatly increased. Such current densities require an electrode of small diameter (2-3 mm.). Depth of fusion during welding increases 1.5-2.5 times; because of the increased thickness of metal which may be welded, great economies of electric power consumption are achieved. (K1)

64K. Heat Regulation During Spot Welding. (In Russian.) K. A. Kochergin. *Avtogennoe Delo* (Welding), Sept. 1949, p. 9-10.

Dependence of tensile strength of spot welds on temperature under the electrode and, thus, on electric-power input to the electrode was investigated. (K3)

65K. Electric-Arc Welding of "Elektron" Alloy in an Argon Atmosphere. (In Russian.) Ts. S. Braude. *Avtogennoe Delo* (Welding), Sept. 1949, p. 10-14.

Alloy contains 1.23-1.6% Mn; about 0.10% Ca; remainder, Mg. Argon-arc welding of Mg alloys does not re-

quire a flux; strength of welded joint is 70-90% that of the base metal; use of backing is recommended; and both alternating and direct (reverse polarity) currents may be used. Optimum welding conditions; mechanical test data. (K1, Mg)

66K. Use of Technological Characteristics of Electrodes for Production Estimates. (In Russian.) A. A. Erokhin. *Avtogennoe Delo* (Welding), Sept. 1949, p. 14-18.

A series of examples of how technological characteristics affect time required, consumption of electrode materials, and power requirements for arc welding of individual pieces, thus making production estimation more simple and accurate. 10 ref. (K1)

67K. Experiments on Automatic Welding Under Flux in Chemical Equipment Construction. (In Russian.) L. G. Avrukh. *Avtogennoe Delo* (Welding), Sept. 1949, p. 18-19.

Use of two different fluxes and various combinations of them in automatic welding of low-carbon and stainless-steel apparatus for the chemical industry. (K1, T29, CN, SS)

68K. Automatic Welding Under Flux of Thin Sheet Steel. (In Russian.) M. Yu. Al'per and Z. A. Dobrotina. *Avtogennoe Delo* (Welding), Sept. 1949, p. 20-22.

Experimental investigation of automatic welding of low-carbon steel of 2.5, 3.0, and 4.0-mm. thickness with a low-carbon electrode established the value of a flux containing SiO_2, MnO, TiO_2, CaF_2, FeO, and $K_2O + Na_2O$. This flux guarantees high arc stability without additional superposition of high-frequency current, also a minimum depth of fusion. Optimum welding conditions for each thickness. (K1, CN)

69K. Welding of "Electrorivets" Under Flux Without Need for Piercing the Upper Sheet. (In Russian.) S. A. Egorova, K. L. Mironova, and N. G. Savchenko. *Promyshlennaya Energetika* (Industrial Power), v. 6, Aug. 1949, p. 6-7.

Basic advantages are lack of necessity for punching or drilling holes, high productivity with high-quality work, 20-30% saving of electric power, and marked reduction of power consumption over spot welding. (K1)

70K. Manual Apparatus for Welding Under Flux. (In Russian.) N. E. Nosenko. *Promyshlennaya Energetika* (Industrial Power), v. 6, Aug. 1949, p. 7-8.

Gun-type apparatus. The electrode wire is fed from a loose coil, perhaps 12 in. in diameter. (K1)

71K. (Book) **Methods of Joining Pipe.** J. E. York. 236 pages. Industrial Press, 148 Lafayette St., New York 13, N. Y. U. S., $3; Canada and foreign, $3.40.

Covers all types of pipe joints, including expansion joints. Grouped into chapters on screwed joints for ferrous and brass pipe; flanged pipe joints; welded and brazed pipe joints; methods of joining cast-iron pipe; joints for thin-wall tubes; joints for plumbing and chemical-resistant pipe; joints for other nonferrous pipe. (K general)

72-K. Details of Some Recent Developments in the Joining of Sheet Material by Spring-Joint Methods. W. Cookson. (Continued.) *Sheet Metal Industries*, v. 27, Jan. 1950, p. 23-25, 34.

A general-purpose clip joint, a corner joint, air-duct fittings, and a general-purpose sheet-roofing joint. (To be continued.) (K13)

73-K. Survey of Modern Theory on Welding and Weldability. (Continued.) D. Séférian. *Sheet Metal Industries*, v. 27, Jan. 1950, p. 53-64.

All types of weld tests, both macro and micromechanical. Test setups and tables giving typical results. (K9)

74-K. Thick Aluminum and Stainless Steel Joined by New Inert-Gas Shielded Metal-Arc Welding. H. R. Clauser. *Materials & Methods*, v. 31, Jan. 1950, p. 53-56.

Development of new equipment which employs consumable metal electrodes further improves this welding process, and greatly extends its use in joining difficult-to-weld materials. (K1, Al, SS)

75-K. Trends in Fabrication by Welding. S. V. Williams. *Canadian Metals*, v. 13, Jan. 1950, p. 39-43. Reprinted from *Welding Journal*. (K general)

76-K. New Techniques Feature Capitol Re-Roofing. *Sheet Metal Worker*, v. 41, Jan. 1950, p. 140-142.

Self-propelled electric batten seamer used for the first time in constructing an all-copper roof for the U. S. Capitol. It operates on the same principle as a conventional lock-forming, or cold roll forming machine. (K13, Cu)

77-K. Heliarc Welding in the Automotive Industry. R. H. Bennewitz and F. J. Pilia. *Western Machinery and Steel World*, v. 41, Jan. 1950, p. 86-89, 102.

(K1, T21, ST)

78-K. Electrolytic Corrosion Eliminated by Nelson Rivweld System. *Modern Metals,* v. 5, Jan. 1950, p. 22.

New-type fastener which prevents aluminum-to-steel contact at the fastening point. This device consists of a flux-filled, cadmium-plated steel female stud with a cross-shaped aluminum insert. (K13, Al, ST)

79-K. Use of High Strength Structural Bolts in Steel Railway Bridges. A. G. Rankin, Frank Baron, J. E. Bernhardt, W. E. Dowling, R. B. Hennessy, N. E. Nueni, C. T. G. Looney, and H. C. Tammen. *American Railway Engineering Association, Bulletin,* v. 51, Jan. 1950, p. 506-540.

Field-test installations of high-strength structural bolts show superiority of high-strength bolts over rivets. (K13, T26, ST)

80-K. Improved Techniques for Flash Welding Aluminum. Charles Bruno. *Reynolds Metals Technical Advisor,* No. 12, 1950, p. 1-2.

(K3, Al)

81-K. Kalabond RM-2: A New Type Rubber-to-Metal Adhesive. E. V. Osberg and G. S. Schaffel. *Rubber Age,* v. 66, Jan. 1950, p. 416-417.

Adhesive is believed to provide a direct chemical bridge between rubber and metal. It is based on a polymer containing reactive chemical groups. These groups react with miscellaneous surfaces to form a strong chemical bond. (K11)

82-K. Non-Welds: The Investigation and Elimination of a Fault in the Resistance Welding of Aluminium Alloy. G. W. Weeks. *Aircraft Production,* v. 12, Jan. 1950, p. 7-10.

The difficulty was shown to be associated with electrode impact-speed and was overcome by proper control. (K3, Al)

83-K. Oxy-Acetylene Pressure Welding. N. L. G. Lingwood and R. E. Dore. *Machinery* (London), v. 76, Jan. 6, 1950, p. 9.

Process as applied to joining symmetrical parts, such as steel tube and bar. (K2, ST)

84-K. Welded Heat Accumulator for the Pimlico District Heating Scheme. *Welding,* v. 18, Jan. 1950, p. 2-9.

Structural details. Accumulator is 126 ft. high and designed to hold half a million gallons of water at 200° F. (K general, CN)

85-K. Land-Rover Production: The Welding Organization and Technique Developed by the Rover Co., Ltd. *Welding,* v. 18, Jan. 1950, p. 10-16.

Production of multi-purpose industrial and agricultural vehicle resembling a "jeep". It has an all-welded chassis and a spot welded aluminum alloy body.

(K general, T21, CN, Al)

86-K. Causes of Cracking During Welding of Aluminium Alloys. (Concluded.) W. I. Pumphrey. *Welding,* v. 18, Jan. 1950, p. 29-32.

Laboratory tests on Al alloys in 11 alloy systems. Cracking may occur at temperatures above or considerably below the solidus of the alloy being welded when the metal is welded under some degree of restraint. 14 ref. (K9, Al)

87-K. Concerning the Tendency of Light-Metal Sheets to Weld Cracking. (In German.) Walter Bulian. *Zeitschrift für Metallkunde,* v. 40, Nov. 1949, p. 427-428.

Experiments show that metals and alloys whose eutectic is below about 600° C. have a tendency to weld-cracking, while those whose eutectic is above 600° C. do not have this tendency. This limit can, however, be raised or lowered by application of lower or higher arc voltages. Examples with ten different alloying additions to pure Al support the theory that weld cracking is caused by melting or grain-boundary substances. (K9, Al)

88-K. Formation of Pores in Welds and Influence of Flux Composition on Tendency Toward Porosity. (In Russian.) I. I. Frumin, I. V. Kirdo, and V. V. Podgretskii. *Avtogennoe Delo* (Welding), Oct. 1949, p. 1-11.

Investigation for low-carbon steel revealed that the main cause of pore formation, particularly during welding of rusty metal, is solution of hydrogen in the high-temperature zone, and its liberation during recrystallization, with subsequent formation of δ-iron. Methods of avoiding such defects by changing composition of flux and conditions of welding. (K9, CN)

89-K. Choice of Optimum Conditions for Flash Welding. (In Russian.) K. P. Imshennik. *Avtogennoe Delo* (Welding), Oct. 1949, p. 12-15.

Diagram based on experimental and theoretical data permits rapid determination of optimum welding conditions for individual cases. (K3)

90-K. Investigation of Thermal Energy of the Flames of Welding Torches. (In Russian.) V. D. Nechaev. *Avtogennoe Delo* (Welding), Oct. 1949, p. 15-19.

Actual limits of regulation imposed by flow rate of acetylene and jet dimensions were investigated. Standardization of welding torches on this basis. (K2)

91-K. Relationship Between Electrical Characteristics and Technological Properties of Spot Welding Machines. (In Russian.) D. S. Balkovets. *Avtogennoe Delo* (Welding), Oct. 1949, p. 27-30.

Technological characteristics of welding machines cannot be accurately judged according to external characteristics, but are most clearly expressed by the relationship of useful power output to load resistance and internal resistance of the machine. (K3)

92-K. Aircomatic Welding Speeds Tank Fabrication. *Iron Age,* v. 165, Feb. 2, 1950, p. 96.

Use in fabrication of aluminum containers. (K1, Al)

93-K. 100 Welded Homes Per Day. *Industry & Welding,* v. 23, Feb. 1950, p. 20-23.

Welding equipment and procedures at Lustron Corp. (K general, T26)

94-K. Design of Silver Alloy Brazed Joints. Part One. Stress Distribution. *Industry & Welding,* v. 23, Feb. 1950, p. 24, 58.

(K8)

95-K. Automatic Test Welding. *Industry & Welding,* v. 23, Feb. 1950, p. 26-27, 30, 60.

Navy-developed automatic arc welders which assure standard electrode test results. (K1)

96-K. The Progress of Structural Welding. Arsham Amirikian. *Industry & Welding,* v. 23, Feb. 1950, p. 36-39, 61, 64-65.

An illustrated survey.

(K general, T26)

97-K. Structural Metal Adhesives for Aircraft. D. A. Shinn. *CADO Technical Data Digest,* v. 15, Feb. 1, 1950, p. 16-18.

Test results and minimum acceptable mechanical properties. 16 ref. (K12)

98-K. Field Welding H.-P., H.-T. Alloy-Steel Piping. *Combustion,* v. 21, Jan. 1950, p. 36-37.

Series of photos shows steps in welding an alloy steel pipe to a cast steel gate valve and subsequent stress relief. (K general, J1)

99-K. How To Make Consistent Spot Welds. J. Heuschkel and H. Bitzer. *Steel,* v. 126, Feb. 6, 1950, p. 82-86, 110, 112, 114, 116, 118.

See abstract from *Welding Journal,* item 22B-379, 1949.

(K3, SS, CN)

100-K. Cold Welding Gets Hot! Clyde B. Clason. *Welding Engineer,* v. 35, Feb. 1950, p. 17-19.

Results of an interview. (K5)

101-K. Welded Blast Furnace Increases Kaiser Capacity by 425,000 Tons. T. B. Jefferson. *Welding Engineer,* v. 35, Feb. 1950, p. 20-21, 26.

Design details and fabrication procedures. (K general, D1)

102-K. Design Considerations in Resistance Welding. II. (Concluded.) Wallace A. Stanley. *Welding Engineer,* v. 35, Feb. 1950, p. 22-26.

Weldability of various metals and alloys—low-carbon steel; stainless and special steels; stainless to carbon steel; aluminum and magnesium; brasses and bronzes; zinc die-cast materials; lead and copper; cast iron, coated metals; nickel and tantalum; tungsten and molybdenum; gold, silver, and platinum; and welding dissimilar metals. (K3, K9)

103-K. 13 Tricks for Better Operation in Oil Fields. Elton Sterrett. *Welding Engineer,* v. 35, Feb. 1950, p. 36-39.

Examples of application of welding to oil-field maintenance and construction jobs. (K general, T28)

104-K. Brackets Welded: Inert-Arc; Metal-Arc. George M. Worden. *Welding Engineer,* v. 35, Feb. 1950, p. 33.

New inert-gas process of welding with a consumable aluminum electrode which paid cost of equipment with one contract. (K1, Al)

105-K. Jobs for Manual Hidden-Arc Welding. C. G. Herbruck. *Welding Engineer,* v. 35, Feb. 1950, p. 34-35.

Four typical jobs at different companies. Advantages. (K1)

106-K. Lincoln's Welded Welding Plant. *Welding Engineer,* v. 35, Feb. 1950, p. 40.

Application of welded steel and aluminum in new Lincoln Electric Co. plant. (K general, T26)

107-K. Welding in an Aircraft-Engine Plant. George H. DeGroat. *Machinery* (American), v. 56, Feb. 1950, p. 153-156.

Techniques employed by Wright Aeronautical Corp. in fabricating velocity turbines for the "Turbo-Cyclone" engine. Various ferrous and nonferrous high-temperature alloys are joined by Heliarc and metal-arc processes. (K1, T24, SG-h)

108-K. Resistance Welding Drops Solar's Production Costs. *Western Metals,* v. 8, Jan. 1950, p. 32.

Some equipment and procedures at Solar Aircraft Co. (K3)

109-K. Weldability of Metals by Resistance Welding Techniques. Wallace A. Stanley. *Product Engineering,* v. 21, Feb. 1950, p. 88-91.

Suitability of various metals, alloys, and plated materials for spot, projection, flash, butt, and seam welding. General precautions, and thickness and shape limitations. Tables

of general weldability of metals for resistance welding and recommended electrode materials for spot welding similar and dissimilar metals. (K3)

110-K. Stainless Steel Rivets Improve Joint Strengths in Aluminum. Roy A. Miller. *Product Engineering*, v. 21, Feb. 1950, p. 112-116.

Effects of alloy variations and head shape on strength and upsetting characteristics of stainless-steel rivets, and on fatigue and corrosion resistance of sheets joined by them. (K13, SS, Al)

111-K. Standardized Locomotive Production. E. F. McCaleb. *Steel Processing*, v. 36, Jan. 1950, p. 34-35, 44.

Miscellaneous fabrication procedures, with emphasis on welding, at Locomotive Engineering Div., General Electric Co., Erie, Pa. (T23, K general)

112-K. Welded Construction Applied to Jig and Fixture Building. Wade H. Kerr. *Tool & Die Journal*, v. 15, Feb. 1950, p. 59-60, 88.

How welded construction in jig and fixture work may replace former methods. Two principal examples are welded steel replacing gray-iron castings and welded steel preferred to parts held together by screws, dowels, and rivets. (K general, T5)

113-K. Overseas Assembly; A Review of the Methods and Equipment Developed. *Automobile Engineer*, v. 40, Jan. 1950, p. 9-12.

Welding jigs and fixtures used in assembly after overseas shipment of automotive-body sections made by British firm. (K general, T21)

114-K. Copper Brazing Turned Parts to Mild Steel Sheet. H. E. Lardge. *Machinery* (London), v. 76, Jan. 19, 1950, p. 100. (K8, CN)

115-K. Stability and Design of Welded Structures of Steel A52. (Concluded.) (In French.) Lucien J. Vanderperre and Alexandre Sariban. *Revue de la Soudure; Lastijdschrift*, v. 5, no. 4, 1949, p. 213-228.

Interpolation and extrapolation calculations, and conclusions. (K general, ST)

116-K. Brazing and Welding Methods for Subassemblies. P. H. Brotzman, Lawrence Jacobsmeyer, J. N. Woolrich, and S. M. Spice. *Metal Progress*, v. 57, Feb. 1950, p. 213-219.

Report of an "Economy-in-Production" round-table discussion at the 1949 annual ASM convention. Brotzman discusses silver brazing; Jacobsmeyer, copper brazing and brazing of stainless; Woolrich, aluminum brazing; and Spice, welding. Information concerning production experiences in individual plants. (K8)

117-K. Cold Welding. W. L. Warner. *Metal Progress*, v. 57, Feb. 1950, p. 238, 240, 242, 244, 246, 248.

Condensed from three articles by R. F. Tylecote in *Transactions of the British Welding Research Association*, Nov. 1945, Nov. 1948, and Feb. 1949 (items 22-19, 1946; 22d-74, 1948; 22D-25, 1949); and by V. W. Cooke and A. Levy, *Journal of Metals*, Nov. 1949 (item 22A-254, 1949). (K5, Al)

118-K. Brazing Metals to Nonmetals. *Metal Progress*, v. 57, Feb. 1950, p. 261-262, 264. Condensed from "Metal to Nonmetallic Brazing", C. S. Pearsall and P. K. Zingeser, *Massachusetts Institute of Technology, Research Laboratory of Electronics*, Technical Report No. 104.

See abstract from *Materials & Methods*, item 22A-161, 1949. (K11)

119-K. Hot-Skinning Eliminates Oil-Canning of Thin Sheet Metal. A. L. Schoellerman. *Automotive Industries*, v. 102, Feb. 15, 1950, p. 40-41, 92, 94.

Technique developed by Northrop Aircraft for covering control surfaces exposed to hot exhaust gases with thin sheets of Al or Mg alloy. Thermostatically controlled "heating blankets" are used to eliminate buckling and formation of the defect known as "oil-canning", during the riveting process. The assembly is maintained at 150° F. and held under suitable tension during riveting. (K13, Al, Mg)

120-K. Welding in the Meat Packing Industry. Charles Bonifield. *Welding Journal*, v. 29, Feb. 1950, p. 121-125.

Application of inert-gas-shielded arc welding to stainless steel of 20 gage and heavier to provide handling containers. (K1, SS)

121-K. "Heliarc" Welding in the Automotive Industry. R. H. Bennewitz and F. J. Pilia. *Welding Journal*, v. 29, Feb. 1950, p. 126-136.

Equipment, methods, and procedure. (K1, T21, ST)

122-K. Welded Design of Power Shovels and Buckets. George Bain. *Welding Journal*, v. 29, Feb. 1950, p. 150-153.

Cost comparison between original construction methods and present arc welding shows direct factory savings up to 28% on component parts. Greater design flexibility now permits product changes at considerably less cost. (K1, T4)

123-K. "Deep-Fillet" Technique Is Especially Adapted to A.C. Welding.

Welding Journal, v. 29, Feb. 1950, p. 153.
Deep penetration into the root of the joint makes it possible to produce smaller fillets with the same strength as larger fillets made by conventional methods. As a result, welding speeds can often be increased considerably. (K1)

124-K. Welded Stanchions for the Barn. L. M. Smith. *Welding Journal*, v. 29, Feb. 1950, p. 154-155.
Stalls made from small-diameter tubing, oxy-acetylene welded. (K2, T3)

125-K. Brazing. *Welding Journal*, v. 29, Feb. 1950, p. 155-156. Reprinted from *Tempil® Topics*, Oct. 1949.
Recommended procedures and applications. (K8)

126-K. Close Tolerance of Gas Welded Assemblies Made Possible by Unusual Rotating Jig. *Welding Journal*, v. 29, Feb. 1950, p. 156.
Jig for holding the three units which make up a welded air-filter part formed from 20-gage cold rolled steel. (K2)

127-K. Correlation of Test Results. C. F. Tipper. *Welding Journal*, v. 29, Feb. 1950, p. 50s-57s; discussion, p. 57s-58s, 73s.
Various types of tests for determining transition temperatures in mild steel plates are evaluated and correlated with the normal tensile test and consideration given to correlation with service experience in welded structures such as ships. 13 ref. (K9, CN)

128-K. Heavy Gage Copper Welded by Inert-Gas-Shielded Arc Process. John D. Kelley. *Materials & Methods*, v. 31, Feb. 1950, p. 57-58.
How fusion welds can now be satisfactorily made on thicknesses up to ⅝ in. (K1, Cu)

129-K. Welding in Bridgework and Allied Structures. R. G. Braithwaite and D. J. Davies. *Transactions of the Institute of Welding*, v. 12, Dec. 1949, p. 143-145.
Methods of design and construction which lead to greater economy. (K21, T26, CN)

130-K. Welding of Aluminium Alloys: Value of Laboratory Tests. *Transactions of the Institute of Welding*, v. 12, Dec. 1949, p. 146-150.
Discussion of paper by W. I. Pumphrey and D. C. Moore (Oct. 1949 issue). (K9, Al)

131-K. Welding Brains Trust. *Transactions of the Institute of Welding*, v. 12, Dec. 1949, p. 151-155.
A condensed report of a question-and-answer session on notch brittleness of steel; factors limiting prefabrication; effect of hydrogen on weld metal; copper welding; fillet welds in Al; flush patching without backing strips; welding chain links; peening of welds; backing strips on light-gage sheet; stress relief by sunshine; an undercutting problem; war and welding progress; university welding courses; and weld porosity. (K general)

132-K. A Welded Synchrotron. G. C. Poxon and A. G. Thompson. *Welding*, v. 18, Feb. 1950, p. 48-50.
Use of welding in construction of British nuclear-particle accelerator. (K general, T1)

133-K. Fabricated Press Frames. *Welding*, v. 18, Feb. 1950, p. 51-53.
Economies effected by use of automatic welding. Methods and equipment. (K1, CN)

134-K. Mass-Producing Diesel-Electric Locomotives. *Welding*, v. 18, Feb. 1950, p. 54-60.
Welding equipment and procedures of Electro-Motive Div., General Motors Corp. (K general, T23)

135-K. Applications of Ultrasonic Waves. H. O. Willrich. *Welding*, v. 18, Feb. 1950, p. 61-66.
Work of German investigators to discover whether or not ultrasonic waves would improve the quality of spot and arc welds by influencing the formation of the crystal structure. Although the findings are not conclusive, it appears that the treatment may have future possibilities. Ferrous and nonferrous metals were welded. (K1, K3)

136-K. Experimental Study of the Weldability of Steels. R. J. Mouton. *Welding*, v. 18, Jan. 1950, p. 17-27; Feb. 1950, p. 73-82. Translated from the French.
A special form of notch-impact test invented by H. M. Schnadt, a Belgian. The test is being increasingly used on the continent for assessing the serviceability of materials and developing materials with improved properties, for determining weldability, and for forecasting the behavior of structures under service conditions. Second installment: Results of application to three steels, using two different electrodes. (K9, ST)

137-K. Contributions to the Development of Synthetic Rubber Mixtures. Part 2. (Concluded.) (In German.) G. E. Proske. *Kautschuk und Gummi*, v. 1, Aug. 1949, p. 209-211; Sept. 1949, p. 245-246.
Testing of rubber-brass bonds. Effect of various ingredients in Buna-S

mixtures; and adhesive solutions as a means of improving adhesion to brass. Sept. issue: Effects of different types of filler on physical and vulcanization properties of synthetic-rubber mixtures. (K11, Cu)

138-K. (Book) **Welding Dictionary.** (English, French, German, and Spanish.) R. N. Thompson and G. Haim. 234 pages. Louis Cassier Co., Ltd., Dorset House, Stamford St., London, S.E.1, England. 21s. net.

In addition to the large number of terms specifically related to welding, many expressions pertaining to electrical and mechanical engineering and to metallurgy are included. (K general)

139-K. (Book) **Economics of Welding Processes Applied to Tube Production.** (In German.) F. W. Griese. 88 pages. Friedr. Vieweg & Sohn, Braunschweig, Germany. 6.8 DM.

Relative costs of several different welding processes when applied to the fabrication of tubes, pipes, and cylindrical bodies. Limitations and advantages of the various methods chiefly from the viewpoints of speed and cost. Limited to the low-carbon steels. (K general, CN)

140-K. Aircomatic Fabrication of Gas Heaters. *Iron Age,* v. 165, Feb. 23, 1950, p. 86-87.

Use of inert-gas shielded-arc process for fabrication of heaters made from Alcoa sand-casting alloy No. 108. (K1, Al)

141-K. Design for Spot Welding Aluminum. Gilbert C. Close. *Light Metal Age,* v. 8, Feb. 1950, p. 6-7, 32. (K3, Al)

142-K. Cold Pressure Welding. *Light Metal Age,* v. 8, Feb. 1950, p. 14-15.

Emphasis on applications to Al. (K5, Al)

143-K. Aluminum Awnings by Aircomatic Welding Process. *Light Metal Age,* v. 8, Feb. 1950, p. 22. (K1, Al)

144-K. Details of Some Recent Developments in the Joining of Sheet Material by Spring-Joint Methods. (Concluded.) W. Cookson. *Sheet Metal Industries,* v. 27, Feb. 1950, p. 123-125.

Examples of some drum and packing-box closures. (K13)

145-K. Modern Refrigerator Production at the Hendon Plant—Frigidaire Division of General Motors Ltd. (Concluded.) J. Peers. *Sheet Metal Industries,* v. 27, Feb. 1950, p. 141-146.

Welding equipment and procedures applied to various ferrous and nonferrous components. (K general, T10)

146-K. Welding Research and Production in the U. S. A. H. G. Taylor. *Sheet Metal Industries,* v. 27, Feb. 1950, p. 159-162.

An illustrated survey. 12 ref. (K general)

147-K. Wood's Metal Replaces Assembly Fixtures. Ben C. Brosheer. *American Machinist,* v. 94, Mar. 6, 1950, p. 116-118.

How turbine blades for hydraulic torque converters are set in place with low-melting-point alloy instead of complicated fixtures, prior to riveting. (K13, T5, Bi)

148-K. Carbide Tool Design for Freedom From Brazing Stress. (Continued.) Malcolm F. Judkins. *Tool & Die Journal,* v. 15, Mar. 1950, p. 44-46. (K8, SG-j)

149-K. Cold Pressure Welding of Non-Ferrous Metals. *Production Engineering & Management,* v. 25, Mar. 1950, p. 63-64. (K5, EG-a)

150-K. Band Saw Welding. S. R. Chase. *Wood,* v. 5, Jan. 1950, p. 31.

Specialized procedure using special jigs, gas fusion welding, forging, and tempering. (K2, J29, ST)

151-K. Silver Soldering on Intake Manifold Line. W. Joseph Hutts and William F. Rader. *Western Machinery and Steel World,* v. 41, Feb. 1950, p. 63-65.

Methods developed for eight different types of induction and torch soldering operations on aircraft intake manifolds. Most difficult was the job of joining a drop-forged stainless-steel flange to an SAE 1010 20-gage gusset which was itself spot welded and silver soldered to a 20-gage Cr-Mo pipe. Change from torch to induction soldering resulted in major economies. (K7, CN, SS, AY)

152-K. Tanks Can Be Simple. J. J. Sloan. *Western Machinery and Steel World,* v. 41, Feb. 1950, p. 76-78.

Recommendations for tank design and welding fabrication. Emphasis is on the type of tank used to hold aircraft fuel. (K general, T26)

153-K. Practical Welding Metallurgy. E. W. P. Smith. *Industry & Welding,* v. 23, Mar. 1950, p. 32, 34-35.

Practical information for the nonmetallurgist who wants to know what causes trouble in welding some steels, and what can be done to overcome the trouble. (K9, ST)

154-K. Versatile Welding Fixture. *Industry & Welding,* v. 23, Mar. 1950, p. 70.

Fixture for inert-arc seam or spot welding of a wide range of sheet-metal thicknesses. (K1)

155-K. Joining Stainless to Chrome-Moly. T. B. Jefferson. *Welding Engineer,* v. 35, Mar. 1950, p. 27.

Method of joining turbine throttle valves of Type 347 stainless to Cr-Mo steel piping. The stainless has a 50% greater coefficient of expansion. It was necessary to use a "transition" piece of gradually varying composition. The "Kelcaloy" or electric-ingot process was used to cast a stainless steel section onto a Cr-Mo steel forging. (K general, AY, SS)

156-K. R: Preheat to 500 F. Fred M. Burt. *Welding Engineer,* v. 35, Mar. 1950, p. 28-30.

Prescription for welding high-Cr pump barrels: preheat and maintain the preheat temperature. Ingenious rotating fixtures for hard facing of sleeves and other parts. (K1, L24, AY)

157-K. If You Want To Make a Good Gas Weld—Watch Flame Adjustment. A. DiNardo. *Welding Engineer,* v. 35, Mar. 1950, p. 32-34.

Recommended procedures. SAE 1025 weld microstructures for neutral, carburizing, and oxidizing flames are illustrated. (K2, CN)

158-K. Bumps Avoided. Ira Carroll. *Welding Engineer,* v. 35, Mar. 1950, p. 35.

New streetcar rails turned out to be ¾ to 1 in. higher than adjoining older section. To avoid bumping, emergency build-up was made by arc welding. (K1, L24)

159-K. Fixtures Aid Welding of "American Kitchens" Cabinets. Walter Rudolph. *Welding Engineer,* v. 35, Mar. 1950, p. 36-37.

Resistance-welding equipment. (K3, T10)

160-K. Welded Machine to Process Meats. William C. Henzlik. *Welding Engineer,* v. 35, Mar. 1950, p. 38-40.

Steel meat-packing equipment made by various welding procedures. (K general, T29)

161-K. Riveted Framing Was Changed To Welded When Cost Comparisons Showed That Welded Building Frame Saved Money. *Engineering News-Record,* v. 144, Mar. 9, 1950, p. 31-33. (K general, T26, CN)

162-K. Adhesives for Metals. C. J. Moss. *Plastics Institute, Transactions,* v. 18, Jan. 1950, p. 64-67; discussion, p. 71-73. (K12)

163-K. New Metal Bonding Process; Various Applications in Industry. K. S. Meakin. *Metal Treatment and Drop Forging,* v. 16, Winter 1949-50, p. 225-228, 230.

Bonding by gluing and its advantages over joining by welding or soldering. Technique, using the "Redux" process; application in various industries. (K12)

164-K. Rubber as a Stress-Carrying Material and Some Design Considerations. S. W. Marsh. *Institution of Mechanical Engineers, Proceedings* (Automobile Div.), 1948-49, p. 25-31; discussion, p. 31-41.

Includes rubber-metal bonding and typical failures. (K11)

165-K. Cold Pressure Welding of Aluminium Cable Sheaths. *Engineering,* v. 169, Feb. 10, 1950, p. 150.

Welding equipment and procedure. (K5, Al)

166-K. Arc Welding in an Argon Atmosphere. (In French.) R. Arnaud. *Soudure et Techniques Connexes,* v. 3, Nov.-Dec. 1949, p. 259-267.

Methods for inert-gas arc welding, using gases such as argon or helium. Optimum conditions for the individual methods, and electrical circuits of apparatus. (K1)

167-K. Welding in the Construction of Modern Locomotives. (In German and French.) M. G. Borgeaud. *Zeitschrift für Schweisstechnik; Journal de la Soudure,* v. 39, Dec. 1949, p. 215-224; v. 40, Jan. 1950, p. 8-11.

Problems and methods of welding with due regard to stress conditions. (K general, T23)

168-K. Metallizing (Making Conductive) of Glass and Synthetics. (In German.) *Metalloberfläche,* sec. B, v. 2, Jan. 1950, p. 9-11.

Brief specifications for coating glass and plastics with metal films by a number of different methods. (K11)

169-K. Structure and Properties of the Heat-Affected Zones of Welded Al-Cu-Mg Stampings. (In German.) H. Kostron and A. Müller-Busse. *Metall,* v. 4, Feb. 1950, p. 41-48.

Structure, hardness, and corrosion resistance of the heat-affected zones of aluminum alloy containing 4.07% Cu, 1.39% Mg, 0.96% Mn, 0.67% Si, and 0.52% Fe, after gas and arc welding. (K9, Al)

170-K. Welding Stainless Steel Pipe. Allen J. Ely, Jr. *Heating and Venti-*

lating, v. 47, Feb. 1950, p. 63-67; Mar. 1950, p. 70-72.
(K general, SS)

171-K. Controlling Welding Distortion. C. G. Bainbridge. *Canadian Metals,* v. 13, Feb. 1950, p. 41-44.
Main causes of welding distortion and practical methods for control. (K general)

172-K. Flush Head Screw Allowables in 24S-T Alclad Sheet Joints. Harold G. Brilmyer. *Product Engineering,* v. 21, Mar. 1950, p. 109-112.
Tests of shear-loaded lap joints to determine allowable shear and bearing loads for 100° steel screws in Alclad sheet. Allowables are set up for different sheet thicknesses. (K13, Al)

173-K. Assembly of Thin-Walled Parts by Rubber Crimping. Frank R. Simpson. *Product Engineering,* v. 21, Mar. 1950, p. 144-148.
How thin-walled metal parts can be assembled by crimping at high pressure, using rubber rings that are constrained on all sides except the working surface. Properly formulated and supported, rubber can transmit pressures in the order of 30,000 psi. The process gives tighter joints, with low residual stress. (K13)

174-K. A Survey of Modern Theory on Welding and Weldability. (Series continued.) D. Séférian. *Sheet Metal Industries,* v. 27, Mar. 1950, p. 241-253.
Various types of weld defects, their causes, and prevention. Destructive and nondestructive weld inspection methods. (Series to be continued.) (K9, S13)

175-K. Application of Mild-Steel Electrodes. F. R. Strate and R. I. Strough. *Welding Journal,* v. 29, Mar. 1950, p. 193-197.
Fundamental elements governing choice. (K1, T5, CN)

176-K. 1949 Adams Lecture: Fatigue of Structural Joints. Wilbur M. Wilson. *Welding Journal,* v. 29, Mar. 1950, p. 204-210.
Advantages and disadvantages of arc welding as a means of fabricating steel structures, importance of fatigue, and design considerations. (K1, Q7, CN)

177-K. The German Heating Electrode. *Welding Journal,* v. 29, Mar. 1950, p. 210.
Brief note gives compositions of core rod, slag, and metal occasionally deposited by a special electrode used only for local preheating and postheating, but not for deposition of weld metal. Original previously abstracted. See "The Heating Electrode, a New Means of Local Heat Treating and Heating", H. Schottky and F. H. Müller, *Schweissen und Schneiden,* item 18A-29, 1949. (K1, J1)

178-K. The Homopolar Generator for Resistance Welding. Thomas J. Crawford. *Welding Journal,* v. 29, Mar. 1950, p. 211-215.
Basic elements consist of a homopolar generator, a flywheel, a carbon-pile contactor, and a three-phase induction motor drive. Characteristics and advantages. Mechanical properties of ferrous and nonferrous welds. (K3)

179-K. Arc Welding in Railroad Shops. E. Di Liberti. *Welding Journal,* v. 29, Mar. 1950, p. 227-230.
(K1, T23)

180-K. How To Bronze Weld. C. H. Wanamaker. *Welding Journal,* v. 29, Mar. 1950, p. 235-237.
(K8)

181-K. Preliminary Results of Welding-Peening Investigation. J. Lyell Wilson. *Welding Journal,* v. 29, Mar. 1950, p. 97s-108s.
Peening is often used as an adjunct to the welding process to improve weld properties. Plans for a comprehensive investigation made to evaluate each of the many variables involved. New experimental equipment and details of calibration of several peening hammers. (K general, G23)

182-K. The High-Frequency Notch-Bend Test. Bela Ronay. *Welding Journal,* v. 29, Mar. 1950, p. 122s-125s.
An economical method for determining the applicable welding procedure for ferritic steels. (K9, ST)

183-K. Seam Welding Monel Metal to Steel. Ernest F. Nippes, Allan R. Pfluger, and Gerald M. Slaughter. *Welding Journal,* v. 29, Mar. 1950, p. 134s-140s.
Resistance seam welding of monel to low-carbon steel in the 0.062-in. gage. For the weld times investigated, fusion of both the monel and steel resulted in a heterogeneous weld nugget and led to porosity and cracking in the weld zone. To avoid this effect, seam welds were made with fusion occurring only in the monel. Optimum conditions for producing these "braze" type welds were established. The strengths of these welds exceeded those of seam welds of steel to steel. (K3, Ni, CN)

184-K. Strain-Aging of Arc Welds in Mild Steel. A. E. Flanigan, M. Kaufman, and E. M. Emery. *Welding Journal,* v. 29, Mar. 1950, p. 146s-160s.

Extensive investigation of the strain-aging characteristics of welds made with several types of modern covered electrodes. Certain aspects of the notch-bend test. 19 ref. (K1, Q5, CN)

185-K. Sheet Steel and Spun Aluminum Team Up With Stud-Weld Design To Make Petroleum Tank Vent Valves Convenient To Handle and Easy To Install. George Stewart. *Steel,* v. 126, Mar. 20, 1950, p. 83. (K1, CN, Al)

186-K. Hidden-Arc Welding Applied in Car Building. G. R. Johnson. *Machinery* (American), v. 56, Mar. 1950, p. 143-145.

Welding procedures for railroad cars. (K1, T23, CN)

187-K. Welding Aluminum and Cast Iron Parts. H. E. Gannet. *Railway Mechanical and Electrical Engineer,* v. 124, Mar. 1950, p. 153-156.

Use of inert-gas shielded-arc welding for repair and reclamation of various cast-iron and Al railroad equipment, including diesel-locomotive parts. (K1, T23, Al, CI)

188-K. Repair of Locomotive Plate Frames by Metallic Arc Welding. *Engineering,* v. 169, Feb. 17, 1950, p. 177-179; *Engineer,* v. 189, Feb. 17, 1950, p. 221-223. (K1, T23, CN)

189-K. Synthetic Resins; Applications in the Engineering Industries. C. J. Moss. *Metal Industry,* v. 76, Feb. 24, 1950, p. 143-146.

A few examples of use for joining of dissimilar materials—wood to metal, porcelain to metal, etc. (K11)

190-K. Structural Welding Design. (In German.) Th. Ricken. *Schweissen und Schneiden,* v. 2, Jan. 1950, p. 2-11. (K general, T26)

191-K. A New Process for Hard-Soldering Bicycle Frames. (In German.) H. W. Grönegress. *Schweissen und Schneiden,* v. 2, Jan. 1950, p. 12-14.

The solder is inserted in the form of beads or strips after the frame is assembled. (K7, CN)

192-K. (Book) **Welding Handbook. Ed. 3.** 1650 pages. 1950. American Welding Society, 33 W. 39th St., New York 18, N. Y. $12 in U. S. and Canada; $13 elsewhere.

27 chapters are devoted to various welding processes and equipment. 13 chapters contain information on the ferrous and nonferrous metals commonly welded, including their general properties, how to weld them by the different processes and their uses by different industries. 11 chapters contain information on design, material, workmanship, and inspection requirements for industrial applications. Additional chapters are devoted to data for estimating costs, physics of welding, welding metallurgy, a dictionary of welding terms and definitions, general engineering tables for shop and office use and welding standards. (K general)

193-K. (Book) **Electric Arc Welding Procedure and Practice.** 544 pages. Hobart Trade School, Troy, Ohio. $3.

The procedure and practice of arc welding. Designed for both the student and the practicing welder; also useful to the executive. (K1)

194-K. Efficient Tank Fabrication Requires Special Equipment. A. I. Nussbaum. *American Machinist,* v. 94, Mar. 20, 1950, p. 89-92.

Power-operated weld positioners and rotators combine with specially designed welding (submerged melt) and X-ray inspection for economical production of massive processing equipment. Includes hot spinning and punch-press perforation. Illustrated. (K1, G2, G13, S13, T26, ST)

195-K. Neat Application of Steel Stud Welding. *Light Metals,* v. 13, Mar. 1950, p. 166-167.

Installation of floor-to-floor window frames in the new United Nations Secretariat Building, which was simplified and speeded by use of stud-welded fasteners. Cd-plated steel studs are welded to I-beam sections, which are cast in the concrete floor. (K1, T26, Al)

196-K. Chevrolet Adopts Automatic Transmission. Thomas E. Lloyd. *Iron Age,* v. 165, Mar. 23, 1950, p. 70-74.

Assembly, spot welding, brazing, materials handling, and inspection procedures (mostly mechanical gaging). Second of two articles. (K3, K8, S14, T21, ST)

197-K. Cutting Costs by Improving Resistance Welding Tooling. Clarence C. Broner. *Iron Age,* v. 165, Mar. 30, 1950, p. 102-103.

Welding methods using equipment produced by Sciaky Bros. (K3)

198-K. Testing Adhesion in Glass-Metal Seals. Norman Allen. *Metal Progress,* v. 57, Mar. 1950, p. 337-338.

Simple and rapid test. A bead of the glass under investigation is welded onto a length of wire or rod of the metal. This test piece is then subjected to tensile testing. (K11)

199-K. New Indium-Bearing Solders Have Improved Alkali Resistance. S. M. Grymko and R. I. Jaffee. *Materials & Methods,* v. 31, Mar. 1950, p. 59-60.

Joints made with these new soft solders in mild steel did not lose strength even after 31-day immersion in strong alkaline solutions. A range of alloy compositions containing 10-50% In, 0-50% Pb, and 0-90% Sn was tested, with emphasis on modifications of the 50-50 Pb-Sn type. The most desirable solder investigated contained 25% In, 37.5% Pb, and 37.5% Sn.
(K7, R5, Pb, Sn, In, CN, SG-f)

200-K. Welding on Products Line in Service. L. J. Bernard, C. C. McRoy, J. N. Stephens, and A. B. Hannah. *Petroleum Engineer,* v. 22, Mar. 1950, p. D56, D58, D60.

Recommended procedures for safety and satisfactory results. Only electric-arc welding is used. (K1, ST)

201-K. Spot Welding; A Comparison of British and American Practices. A. J. Hipperson. *Welding,* v. 18, Mar. 1950, p. 112-117.

Limited to mild steel sheet.
(K3, CN)

202-K. Developments in Locomotive Construction. *Welding,* v. 18, Mar. 1950, p. 118-122.

Some developments in application of welding to British locomotive construction. (K general, T23, ST)

203-K. Repair of Locomotive Plate Frames by Metallic Arc Welding. (Concluded.) *Engineering,* v. 169, Mar. 3, 1950, p. 251-253.

Described, diagrammed, and illustrated. (K1, T23, CN)

204-K. The Schnadt Tests and Their Applications to Welding. *Welder,* new ser., v. 18, Oct.-Dec. 1949, p. 74-77.

Theories of Henri Schnadt, on which his tests are based, are a radical departure from many of the principles underlying the present-day standard tests. They are said to create an entirely new conception of the properties of metals, and their originator claims that they show many of our existing standards to be both meaningless and sometimes completely misleading.
(K9, Q general)

205-K. Properties at Low Temperatures. E. C. Rollason. *Welder,* new ser., v. 18, Oct.-Dec. 1949, p. 78-79, 90.

Mechanical properties at temperatures down to −60° C. of welds in steels made with Murex (British) electrodes. (K1, Q general, ST)

206-K. The Development and Future Prospects of Electric Arc Welding in Spanish Naval Shipyards. Antonio Villanueva Nuñez. *Welder,* new ser., v. 18, Oct.-Dec. 1949, p. 81-84. Translated and condensed from the Spanish.
(K1, T22, ST)

207-K. Spotlight on Arc Welding. IV. *Welder,* new ser., v. 18, Oct.-Dec. 1949, p. 85-88.

Weld fabrication of a variety of heavy equipment by a British firm. (K1, ST)

208-K. Certain Metallurgical Peculiarities of Automatic Welding at High Speeds. (In Russian.) B. I. Medovar. *Avtogennoe Delo* (Welding), Nov. 1949, p. 3-7.

Interaction of metal and slag during automatic welding under flux at a rate of 120-150 meters per hr. was investigated for low-carbon steel (8-12 mm. thick) with a 200-kv. arc. Influence of arc length, of degree of oxidizability of flux, and of proportion of electrode metal in the weld on chemical composition of weld metal was determined. Optimum welding conditions for different situations. 13 ref. (K1, CN)

209-K. Spot Welding of "SKhL2" Steel With Electrothermal Treatment. (In Russian.) A. S. Gel'man and S. S. Astaf'ev. *Avtogennoe Delo* (Welding), Nov. 1949, p. 7-14.

Experimental investigation of effectiveness of electrothermal treatment of the welds in a low-alloy structural steel 4-8 mm. thick. A substantial improvement of mechanical properties was achieved by this treatment. Optimum conditions for different thicknesses of steel.
(K3, J1, CN)

210-K. Influence of Type of Electrode on Geometry of Welds. (In Russian.) 'A. A. Erokhin. *Avtogennoe Delo* (Welding), Nov. 1949, p. 14-21.

Investigation of welding of low-carbon and 18-8 stainless steel, using a variety of electrode types. Relations between height of bead, width and depth of fusion, current, rate of welding, efficiency of heating process, length of arc, and voltage.
(K1, CN, SS)

211-K. Investigation of the Welding Arc in Argon. (In Russian.) A. Y. Brodskii. *Avtogennoe Delo* (Welding), Nov. 1949, p. 21-23.

Results of research on arc parameters during static conditions in commercial argon (86.6% A, 12.7% N_2, 0.6% O_2, and 0.1% CO_2), taking into consideration the depth of the welding crater. Causes of deformation of tips of tungsten electrodes. (K1)

212-K. Welding Medium-Carbon Steel With "TsM-7" Electrodes. (In Russian.) A. S. Shapiro and K. M. Sun'kov. *Avtogennoe Delo* (Welding), Nov. 1949, p. 23-25.

Applicability of above electrodes—

originally designed for welding low-carbon steel—to welding of medium-carbon steel was investigated. Results of mechanical tests of the welds. Composition of electrodes. (K1, CN)

213-K. New Apparatus for Welding of Aluminum Wires and Soldering. (In Russian.) I. A. Antonov. *Avtogennoe Delo* (Welding), Nov. 1949, p. 26-28.

Specially developed devices for welding Al cables and conductors and for soldering and preheating. Operating characteristics. (K general, Al)

214-K. Electrical Spot Welding Under Flux Using a Special Gun Developed by E. O. Paton's Institute of Electric Welding of the Academy of Sciences of the U.S.S.R. (In Russian.) V. I. Kuznetsov and M. I. Kunis. *Avtogennoe Delo* (Welding), Nov. 1949, p. 30-31.

Manually operated welding gun and method of operation. (K3)

215-K. "Redux" Bonding of Aircraft Structures. C. J. Moss. *Aero Digest,* v. 60, Apr. 1950, p. 52-53, 94-96.

Use of adhesive bonding of Al alloy assemblies of British aircraft. Mechanical test data. (K12, Q general, Al)

216-K. Latest Press-Shop Methods Produce Latest Torque Converter. Charles H. Wick. *Machinery* (American), v. 56, Apr. 1950, p. 158-167.

How hydraulic torque converters for automatic transmissions are made from precision stampings spot welded and copper-brazed to pressed-metal housings. (K3, K8, G3, T21, CN)

217-K. Metal Bonding. *Mechanical Engineering,* v. 72, Apr. 1950, p. 331-332.

Redux process which employs the adhesive properties of synthetic resins for the bonding of metal to metal and metal to other materials such as wood and plastics. (K11, K12)

218-K. Designing for Projection Welding. Wallace A. Stanley. *Product Engineering,* v. 21, Apr. 1950, p. 113-117.

How to use projection welding for sheet stock, forgings, curved surfaces, waterproof joints, wire, and fasteners. Shape, size, and shear strength of common types of projections and basic rules for obtaining successful joints. (From book to be published by McGraw-Hill.) (K3)

219-K. Spot Welded Joint Details for Lower Cost Assembly. *Product Engineering,* v. 21, Apr. 1950, p. 130-131.

Diagrams and captions show edge design, methods of bracing corners, self-locating sections, and other details. (K3)

220-K. Welding With Wurlitzer. Clayton B. Herrick. *Industry & Welding,* v. 23, Apr. 1950, p. 24-25.

Use of resistance and inert-arc welding in joining Al parts of juke boxes. (K1, Al)

221-K. Welded Design Streamlines Railroad Cars. Roy L. Rex. *Industry & Welding,* v. 23, Apr. 1950, p. 34-35.

Flame and arc welding. (K1, K2, T23, CN)

222-K. Some Thought Starters on Welded Design. *Industry & Welding,* v. 23, Apr. 1950, p. 38, 52, 54.

Diagrams for building machinery bases. (K general, T26)

223-K. Texas to Ohio Pipeline. *Industry & Welding,* v. 23, Apr. 1950, p. 40-42, 68.

Arc welding illustrated. (K1, CN)

224-K. Weldbrazing. Lew Gilbert. *Industry & Welding,* v. 23, Apr. 1950, p. 48-49.

Process was developed primarily to avoid harmful deterioration of the steel structure in the weld zone as well as in the heat affected zone, and to make possible the welding of types of steel which are not weldable by usual methods at the present time. Instead of the nonferrous alloys used in normal brazing, special steel filler alloys have been developed for joining and building up iron, steel, cast iron, copper, brass, bronze, nickel, and other metals and alloys without actual fusion. (K8, L24, SG-f)

225-K. Making Rotors and Turbine Wheels for Newest Allison 400 Jet Engine. *Automotive Industries,* v. 102, Apr. 1, 1950, p. 38-39, 76, 78.

Arc-butt welding for joining heat resistant alloy drop forgings to alloy steel shafts; also several milling and broaching operations. (K1, G17, T25, AY)

226-K. Underwater Welding Aids Ship Salvage. Robert H. Burks. *Welding Engineer,* v. 35, Apr. 1950, p. 20-22.

Techniques used by U. S. Navy to refloat two ships which the Germans had sunk in the harbor of Cherbourg. (K1, T22, CN)

227-K. Gas Welding Aluminum Awnings. *Welding Engineer,* v. 35, Apr. 1950, p. 23.

(K2, T26, Al)

228-K. "Double Ending" Saves Welding Time, Cuts Handling. *Welding Engineer,* v. 35, Apr. 1950, p. 24-25.

How assembly lines at Santa Clara plant of Bechtel Corp. use produc-

tion methods, including automatic welding, for pipe-line construction. "Double ending" or joining two 30-ft. lengths cuts field welding in half. (K1, CN)

229-K. Modern Shop Practice for Modern Ranges. Gerald Eldridge Stedman. *Welding Engineer,* v. 35, Apr. 1950, p. 28-31.

Resistance welding, forming, assembly, and finishing operations. (K3, G general, L general, T10, ST)

230-K. Building Diesels by Unit Assembly. E. F. McCaleb. *Welding Engineer,* v. 35, Apr. 1950, p. 32-35.

Equipment and procedures of General Electric Co. Emphasis is on assembly and welding operations. (K general, T25)

231-K. Production Brazing. Clinton E. Swift. *Welding Engineer,* v. 35, Apr. 1950, p. 36-38.

Claims savings of 40-60% when sheet metal or light-wall tubing is to be fabricated by brazing. Typical examples. (K8, T26)

232-K. Precision Instruments Precision Welded. Lee H. Judge. *Welding Engineer,* v. 35, Apr. 1950, p. 39.

Miscellaneous applications of spot welding by Taylor Instrument Co. (K3, T8)

233-K. Big Welding Jobs in Australia. *Welding Engineer,* v. 35, Apr. 1950, p. 40.

Four examples of welded heavy machinery—presses and torch cutting machine. (K general, T5, CN)

234-K. Digests of Papers Presented at Electric Welding Conference. *Electrical Engineering,* v. 69, Apr. 1950, p. 361-364.

Covers following papers presented at Detroit, Apr. 5-7, 1950, and not scheduled for publication: "New Electrodes for Stabilizing Inert-Gas Welding Arcs", J. D. Cobine; "The Electric Arc in Argon and Helium", T. B. Jones; "Arc Welding Machine Characteristics as They Affect the Welding Arc", George R. Wagner; "Welding Characteristics of Mechanical Rectifier-Type Arc Welder", K. L. Hansen; "Hydraulic Control of Transformer-Type Arc Welders", A. C. Mulder; "High-Frequency Induction Welding", J. R. Bondley; "An Ampere-Squared-Second Indicator for Resistance Welding", N. P. Millar; "Design of Transformers for Resistance Welding Machines", Dean L. Knight; "Multi-Transformer Welding Presses", Jack Ogden; "Ignitrons for Frequency-Changer Welders", R. R. Rottier; "The Effect of the Duration of Voltage Dip on Cyclic Light Flicker", L. Brieger; "Probabilities of Interference Between Resistance Welders", W. K. Boice; and "Welding Power System With Series Capacitors at Main Transformer Primaries". (K1, K3)

235-K. Bonding of Rubber to Metal by Means of New Chemical Derivatives of Rubber. Jacques Gossot. *Rubber Chemistry and Technology,* v. 23, Jan.-Mar. 1950, p. 281-291.

Previously abstracted from *Revue Générale du Caoutchouc.* See item 22A-92, 1949. (K11)

236-K. Welded Construction of Barking Drums. George M. Dick. *Canadian Metals,* v. 13, Mar. 1950, p. 34-37.

Arc welded construction of machinery subject to heavy shock load, used in the pulp and paper industry. (K1, T29, ST)

237-K. Welded Railway Coaches. Hugh G. Jarman. *Canadian Metals,* v. 13, Mar. 1950, p. 40, 42.

Fabrication by arc welding. (K1, T23, ST)

238-K. Welding of Light Alloys. (In French.) Gustave Caminade. *Fonderie,* Jan. 1950, p. 1914-1915.

Various methods for welding of Al alloys. (K general, Al)

239-K. Some Technological Problems in Gas Pressure Welding. (In Russian.) A. S. Fal'kevich. *Avtogennoe Delo* (Welding), Dec. 1949, p. 2-5.

Two methods as applied to steels: Heating pieces to be welded to plasticity and welding under constant pressure (solid phase); and applying low pressure to objects and then increasing pressure during heating (liquid or semi-liquid phase). Influence of temperature, compression forces, and oxide inclusions in weld metal on structural and mechanical properties of welds. (K2, ST)

240-K. Successive Heating of Thin Sheets by Multiflame Torches. (In Russian.) W. N. Rykalin and M. Kh. Shorshorov. *Avtogennoe Delo* (Welding), Dec. 1949, p. 5-13.

As applied to manufacture of welded pipe. Influence of number and size of individual jets, spacing between jets, and acetylene consumption. Design of the torches and method of their use. (K2, F26, CN)

241-K. Equipment and Burners for Gas Pressure Welding. (In Russian.) T. A. Vladimirskii and M. S. Nikitin. *Avtogennoe Delo* (Welding), Dec. 1949, p. 13-16.

Four types of equipment and their operating characteristics. (K2)

242-K. Porcelain Nozzle for Inert-Arc Welding. William A. Mays. *Metal Progress,* v. 57, Apr. 1950, p. 489-490.

Experimental work on the helium-

shielded arc welding of thin sheet metals required a small porcelain or ceramic nozzle that could be used with 1/16 or 0.040-in. tungsten electrodes. The problem was solved by adapting the porcelain insulator of an old spark plug to form a nozzle for a small manual electrode holder. (K1)

243-K. Progress in Rail Pressure Welding. Lem Adams. *Welding Journal,* v. 29, Apr. 1950, p. 283-289.

Historical review, modern practices in pressure welding of rail, and résumé of experiences with this type of joint. (K2, T23, CN)

244-K. Stability Tests of Welding Machines. Charles L. Volff. *Welding Journal,* v. 29, Apr. 1950, p. 290-292.

French arc-welding specifications are reviewed. The principle of stability tests, methods used, and their significance. (K1)

245-K. Should the Guided-Bend Test Be Modified? *Welding Journal,* v. 29, Apr. 1950, p. 293-304.

Extensive discussion of paper by L. K. Stringham (item 22B-286, 1949). Discussers are W. A. Miller, Perry C. Arnold, F. Lang, and Bela Roney. (K9)

246-K. Weldment Design and Engineering Practice. Anthony K. Pandjiris. *Welding Journal,* v. 29, Apr. 1950, p. 305-308.

Fundamentals of the engineering, planning and designing of economical and safe weldments and the necessary follow-through. (K general)

247-K. Evaluation of Tests for Steels for Welded Structures. P. J. Rieppel, R. G. Kline, and C. B. Voldrich. *Welding Journal,* v. 29, Apr. 1950, p. 195s-212s.

Principal objective of research was to evaluate the usefulness of various small mechanical test specimens for indicating performance of large welded structures. Test specimens described in the literature were catalogued and appraised for studying strength, ductility, and notch toughness of welded joints in structural steels. Four of the most promising specimens were selected for further evaluation. (K9, Q23, CN)

248-K. Brazing of Steel. Part I. Elements of Brazing. Part II. Physical Chemistry of Brazing. S. L. Case. *Steel Processing,* v. 36, Mar. 1950, p. 125-129, 161; Apr. 1950, p. 183-185, 199, 206.

Based on research at Battelle Memorial Institute sponsored by Air Materiel Command. Part I: Definitions; the brazing process; form of brazing alloys and methods of application; design of brazed joints; surface preparation of base metal; and flux and fluxing. Part II: Wetting of base metal by brazing alloy; effect of surface condition on wettability; evaluation of wettability; surface tension and capillary flow of brazing alloys; and flow of brazing alloy as a function of base metal-alloy-flux system. (K8, P10, ST)

249-K. How To Repair Tools by Atomic Hydrogen Welding. R. J. Tierney. *Iron Age,* v. 165, Apr. 13, 1950, p. 86-88.

Welding without destroying heat treated properties is solved by the high-temperature shielded flame. The process also permits economical fabrication of new composite dies by welding toolsteel onto less costly base metals. (K1, TS)

250-K. Ingenuity Plus Arc Welding Speed Big Brine Piping Job. M. N. Vuchnich. *Heating, Piping & Air Conditioning,* v. 22, Apr. 1950, p. 86-87.

Method of welding 45,000 ft. of 1¼-in. floor piping for an ice arena. (K1, CN)

251-K. A Survey of Modern Theory on Welding and Weldability. (Continued.) D. Séférian. *Sheet Metal Industries,* v. 27, Apr. 1950, p. 339-346.

The problem of weldability from three aspects—operative, metallurgical, and structural or general weldability. General phenomena of welding; chemical changes in the fusion zone; absorption of gases by molten metal; and precipitation of compounds from solid solution. Begins discussion of eutectic transformations. (To be continued.) (K9)

252-K. Welding of Corrosion and Heat Resisting Steels. J. A. McWilliam. *Welding,* v. 18, Mar. 1950, p. 94-99; Apr. 1950, p. 150-156.

Weldability, with reference to the particular techniques required. In the first part the subject is treated from the metallurgical aspect; and in second, processes suitable for fabrication with these steels are surveyed. (K general, SS, SG-g, h)

253-K. Welding Wrought and Cast Iron. L. Sanderson. *Machinery Lloyd* (Overseas Edition), v. 22, Mar. 18, 1950, p. 83-87, 89.

Various methods.
(K general, CI, Fe)

254-K. Faults in Arc Welds in Mild and Low Alloy Steels. *Welding Research,* v. 4 (bound with *Transactions of the Institute of Welding,* v. 13), Feb. 1950, p. 3r-15r.

Typical faults are defined and illustrated. Reasons for their occur-

rence and ways in which they may be avoided and corrected. Description of each type of fault; cause and prevention; effect on strength; and correction. (K1, CN, AY)

255-K. A Review of Selected Papers on the Flash and Butt Welding of Light Alloys. P. M. Teanby. *Welding Research,* v. 4 (bound with *Transactions of the Institute of Welding,* v. 13), Feb. 1950, p. 16r-20r.

Deals only with aluminum. (K3, Al)

256-K. Explosion of a Compressed Air Container Caused by Poor Welding. (In German.) Emil Banik. *Schweissen und Schneiden,* v. 2, Feb. 1950, p. 36-38.

Defective weld-repair job of an old pressure tank, the explosion of which caused the death of a workman. (K general, T26, CN)

257-K. (Book) **Welding Technology.** F. Koenigsberger. 280 pages. 1949. Cleaver-Hume Press, 42a S. Audley St., London, W. 1, England. 21s. net.

The various welding processes, plant, and equipment. Types of joint, precautions, and welding procedures for ferrous and nonferrous metals. The various methods of flame cutting and gouging. Welding manipulators and fixtures, safety precautions, protective clothing, plant maintenance, distortion and residual stresses, weld strengths and faults, design principles and estimating. (K general)

258-K. (Book) **Electric Arc Welding Manual. Vol. II. Metallurgy.** 182 pages. Murex Welding Processes, Ltd., Waltham Cross, Herts., England. 8s., 6d.

Subjects useful to designers, welding engineers, and supervisors who want to know more about what happens when different materials are welded. Chapters deal with physical metallurgy of iron and steel; cast iron; wrought iron and mild steel; high-tensile and alloy steels; nonferrous metals; hard facing alloys; shrinkage stresses and cracking; and mechanical and nondestructive testing. (K1)

259-K. Improved Technique for Flash Welding Aluminum Tubing Eliminates Interior Flash. Charles Bruno. *Steel,* v. 126, Apr. 24, 1950, p. 79-80.

Equipment and procedure. Since extremely thin welds are much stronger than thick ones, the joints are practically as strong as the metal itself. Al can also be joined to Cu, stainless steel, monel, and to other alloys because the fusion zone is so small that practically no intermixing occurs. (K3, Al)

260-K. Hot Skinning With Light Metal Sheet. Gilbert C. Close. *Light Metal Age,* v. 8, Apr. 1950, p. 6-7, 16.

Method which eliminates buckles and wrinkles. It was developed by Northrop engineers for application of thin, light-metal sheets (Al or Mg) to structural members. Heating pads and mechanical tension are applied before riveting. (K13, Al)

261-K Ultrasonics Aid Soldering. *Iron Age,* v. 165, Apr. 27, 1950, p. 90.

Soldering of Al and other light metals and alloys is made easier by means of a new ultrasonic soldering iron. It consists essentially of a removable copper soldering bit and a magneto-striction transducer. No flux is required and standard soft solders may be used. (K7, Al, Mg)

262-K. Bronze Welding; Procedures for Different Metals and Applications. T. J. Palmer. *Welding,* v. 18, Apr. 1950, p. 159-164.

Includes photomicrographs showing typical deposits and joints. (K8)

263-K. Aluminum-Sheathed Cables; an Application of Cold Pressure Welding. *Welding,* v. 18, Apr. 1950, p. 165. (K5, Al)

264-K. Joining Large Sections of Low Alloy Steels by Gas Pressure Welding. A. I. Nussbaum. *Materials & Methods,* v. 31, Apr. 1950, p. 60-62.

Minimum weight, less machining, and lower welding costs have resulted from adopting gas pressure welding for fabricating aircraft landing gear. (K2, T24, AY)

265-K Low-Carbon Stainless Steels Make Possible Savings in Welded Fabrication. John B. Campbell. *Materials & Methods,* v. 31, Apr. 1950, p. 63-66.

By eliminating need for expensive stabilizing elements and post-welding anneals, the relatively new low-carbon steels reduce cost of fabricating corrosion resistant alloys for a wide range of applications. Mechanical properties and chemical corrosion resistance. (K general, R5, SS)

266-K. Special Jigs and Positioners Speed Production of All-Welded Steel Boats. *Steel,* v. 126, May 1, 1950, p. 90. (K1, T22, CN)

267-K. Glass to Metal Seals. Edwin Ruh. *Ceramic Age,* v. 55, Apr. 1950, p. 236-237, 244.

Mechanism of adhesion, the various types, their properties, and applications. (K11)

268-K. Rubber Bonding. J. M. Buist and W. J. S. Naunton. *IRI Transactions,* v. 25, Apr. 1950, p. 378-406.

Types of bonding agents other

than brass plating. Bonding properties of PI and CDR cements with different metals compared; application of bonding agents in the production of rubber-metal engineering units; and common causes of failure of such units. Testing of both textile and metal-bonding agents, and a new method of testing proposed to replace the present ASTM method. Effects of shape factor and stiffness of the rubber. 11 ref. (K11)

269-K. How To Fusion Weld Cast Iron. *Linde Tips and Oxy-Acetylene Tips,* v. 29, Apr. 1950, p. 29-34.

Recommended procedures. (K2, CI)

270-K. A New Technique in the Manufacture of Soldered Porcelain Potheads. A. E. Papp and J. H. Nicholas. *Transactions of the American Institute of Electrical Engineers,* v. 68, 1949, p. 1258-1260; discussion, p. 1261-1262.

Used for joining copper cables to porcelain. (K7, T1, Cu)

271-K. Weldability of Converter Steels and Their Use in Welded Construction. (In German.) H. Buchholtz. *Schweissen und Schneiden,* v. 2, Feb. 1950, p. 23-32; Mar. 1950, p. 51-55.

Properties and weldability of nonkilled basic bessemer steel, of PN steels (0.012% N and 0.06% P max.), and of "Alto" steels (killed with Si and Al), also results of welding tests with rolled steels and thin, medium, and heavy sheet steel. Applicability to various uses. Concluding part. 10 ref. (K9, CN)

272-K. Temperature Curve of the Base Metal During Multilayer Arc Welding. (In Russian.) N. N. Rykalin and I. D. Kulagin. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Jan. 1950, p. 132-152.

Various factors affecting the above were investigated for butt, lap, tee, and cross welds in low-alloy structural steel. Includes extensive tables and numerous time-temperature curves, also schematic diagrams of the weld types and designs investigated. (K1, CN)

273-K Automatic Welding of Two-Ply Sheets Clad With "08Kh12" Steel. (In Russian.) K. V. Lyubavskii and B. I. Lazarev *Avtogennoe Delo.* (Welding), Jan. 1950, p. 1-10.

Welding of low-carbon steel sheet with stainless-steel cladding. Characteristics of welds obtained by use of three types of electrodes. Special features of the apparatus and optimum welding conditions. (K1, CN, SS)

274-K Process of Fusion During Flash Welding. (In Russian.) A. A. Alov. *Avtogennoe Delo* (Welding), Jan. 1950. p. 11-12.

Investigated from the points of view of three different but simultaneous processes: Formation of "bridges" at contact points due to heat caused by short circuiting, appearance of the "pinch effect" in electric conductors under the influence of an electro-magnetic field, and increase of the coefficient of self-induction due to geometric shape. (K3)

275-K. Welding of 18-8 Steel Containing Molybdenum. (In Russian.) I. Z. Kagan *Avtogennoe Delo* (Welding), Jan. 1950, p. 17-18.

Effect of adding 2-4% Mo to 18-8 stainless was investigated, especially with respect to welding characteristics. (K general, SS)

276-K. Soldering of Stainless Steels With Soft Solders. (In Russian.) S. N. Lotsmanov and A. S. Medvedev. *Avtogennoe Delo* (Welding), Jan. 1950, p. 18-21.

Optimum conditions of soldering for different fluxes. Special advantages and disadvantages of acid and anticorrosive fluxes. (K7, SS)

277-K. Special Fixture Welds Tractor Hoods. Herman J. Schaefer. *American Machinist,* v. 94, May 1, 1950, p. 83.

Spot welding equipment used by Oliver Corp. (K3, T21, CN)

278-K. New Flash Butt-Welder Joins ¼-Inch Strip in 10 Seconds. Dan Reebel. *Steel,* v. 126, May 8, 1950, p. 85-86.

U. S. built equipment for French plant, which is capable of flash welding the ends of 0.250-in. thick hot-rolled coils up to 62 in. in width. (K3, CN)

279-K. What About Welding Odors? Lew Gilbert. *Industry & Welding,* v. 23, May 1950, p. 24-26, 51.

Concludes that the problem is of little importance. (K general, A7)

280-K. Design for Silver Alloy Brazing. Part Two. Tapered Section in Rigid Members. *Industry & Welding,* v. 23, May 1950, p. 28, 30-31, 72-73. (K8)

281-K. Manual "Hidden Arc" Welding. *Industry & Welding,* v. 23, May 1950, p. 34-35, 37, 74.

Several examples of application to steel fabrication in different plants. (K1, ST)

282-K. Production Know-How Combines With Oxy-Acetylene Welding To Produce All-Welded Aluminum Chairs.

Industry & Welding, v. 23, May 1950, p. 58, 60-61.
(K2, T10, Al)

283-K. Home Built Pressure Welder Produces Precision Parts. Gilbert C. Close. *Industry & Welding,* v. 23, May 1950, p. 75-77.

Equipment for precision hot pressure welding of circular-ring components, including aircraft jet-engine blast-tube supports, high-pressure gaskets for oil-line valves and fittings, and rigging handling rings for shipyard and oil-field use. Applicable to ferrous and nonferrous metals. (K2)

284-K. Bi-Metallic Construction Extends Piston Life. *Product Engineering,* v. 21, May 1950, p. 100.

Ring area of Al-alloy pistons is subject to a high rate of wear. United Engine and Machine Co. of San Leandro, Calif., overcomes this problem by adding a ferrous metal insert to the top ring groove. The Al-Fin process is used to bond the insert to the Al alloy.
(K5, T7, Al, ST)

285-K. Induction Brazing Lowers Convector Cost. *Product Engineering,* v. 21, May 1950, p. 101.

Convector air chamber, originally a heavy gray-iron casting, now consists of two stampings and two screw-machine parts silver brazed together. Results of redesign are improved appearance, reduced size and weight, faster production, and 15% decrease in cost. (K8, CI)

286-K. Modern Welding Techniques Cut Fabrication Costs of Solvent Extractor. *Steel,* v. 126, May 15, 1950, p. 82.

Five different applications of stud welding to stainless steel in fabrication of extractor by Vulcan Copper & Supply Co. (K1, SS)

287-K. Miter Welds Without Flash Made Possible by New Flash Welding Techniques. *Reynolds Metals Technical Advisor,* no. 13, [1950], p. 1-2.

Adaptation of percussion technique to miter welding of extruded Al sections. (K3, Al)

288-K. World's Largest Pumps for Grand Coulee Dam. W. E. Christison. *Welding Engineer,* v. 35, May 1950, p. 22-24.

Arc and gas welding, including choice of electrodes. Steel up to 5 in. thick is welded. (K1, K2, T4, CN)

289-K. Pressure Welds With Parent-Metal Strength. L. Van Camp and C. E. Levoe. *Welding Engineer,* v. 35, May 1950, p. 26-28.

Use of "Uniwelding" (a refinement of oxy-acetylene pressure welding) for fabrication of landing gear for large transport planes. Steels generally used are of the SAE 4100 and 4300 series.
(K2, T24, AY)

290-K. Cabinets Reinforced by Carbon Arc. William C. Henzlik. *Welding Engineer,* v. 35, May 1950, p. 32-34.

How extra strength and rigidity are given to steel kitchen cabinets by welding corners and joints with the carbon arc. Drawer guides are also brazed with the carbon arc.
(K1, T10, CN)

291-K. Penstock Production Line. Jim Joseph. *Welding Engineer,* v. 35, May 1950, p. 36-37, 42.

Weld fabrication using automatic submerged-arc equipment of 20-ft.-long sections of 22-ft. diam. penstocks from curved sections of steel plate. (K1, T4, CN)

292-K. Here's What You Gain When You Weld With Low-Frequency Converters. C. B. Stadum. *Welding Engineer,* v. 35, May 1950, p. 38-40, 42.

Electrical system for arc welding. Includes circuit diagrams and graphs. (K1)

293-K. Nomograph for Weight of Electrode Metal Required. Tyler G. Hicks. *Welding Engineer,* v. 35, May 1950, p. 49.
(K1)

294-K. Salvage of Castings by Welding of Defects. B. E. Bellew. *American Foundrymen's Society,* Preprint No. 50-60, 1950, 6 pages.

Equipment, materials, electrodes, and techniques for welding of mild, low-alloy, and stainless steels; gray cast irons; and nonferrous castings, on the basis of economy, efficiency, and adaptation to foundry requirements. (K1)

295-K. Influence of Carbide-Forming Elements on Underbead Cracking of Low Alloy Steel. Raymond S. Stewart and Stephen F. Urban. *Transactions of American Society for Metals,* v. 42, 1950, p. 653-665.

Investigation to determine the effect of Ti, Zr, Cb, and V on the tendency of low-alloy steel to crack during arc welding. (K9, AY)

296-K. Welding and Assembly of Jet Propulsion Units; Methods Employed by the de Havilland Engine Co., Ltd. *Machinery* (London), v. 76, Apr. 20, 1950, p. 555-562.

Argon-arc welding equipment and procedures, also assembly operations, applied to stainless steel and Al alloys. (K1, T25, Al, SS)

297-K. Welding of Damaged Bronze Bells. (In German.) E. Wiese. *Schweissen und Schneiden*, v. 2, Mar. 1950, p. 45-51.

The correct method of welding cracked and broken church bells. (K general, T9, Cu)

298-K. Possible Defects of Automatically Riveted Joints and Methods for Their Prevention. (In Russian.) M. M. Kraichik and A. V. Obukhov. *Avtogennoe Delo* (Welding), Jan. 1950, p. 12-16.

Equipment and procedure for joining sheet metal by riveting followed by electric welding of the rivets to the sheet. Defects in the welds were studied for low-carbon steel. Principal types of defects were pores, circumferential lack of fusion, and hot cracks. Methods of detecting defects were studied and X-rays shown to be most applicable. (K1, K13, S13, CN)

299-K. Elimination of Deformation During Structural Welding. (In Russian.) G. A. Nikolaev and N. V. Shiganov. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Jan. 1950, p. 48-52.

Investigated theoretically and experimentally. Application of an external load to the parts during their welding is recommended as a method of avoiding residual deformation. Influence of geometry, physical and mechanical properties of the metal, welding conditions, and types and amounts of stresses applied were studied. (K general, CN)

300-K. Designing for Welding. Harry W. Pierce. *Welding Journal*, v. 29, May 1950, p. 371-380.

An AWS educational lecture. General principles and examples. (K general)

301-K. Welded Deck Girder Highway Bridge. Gordon Cape. *Welding Journal*, v. 29, May 1950, p. 380-381.

Discusses paper by Ned L. Ashton (Sept. 1949 issue, item 22B-342, 1949), giving details of experiences of Dominion Bridge Co., Lachine, Quebec, Canada. (K1, T26, CN)

302-K. Problems Associated With the Welding of Stainless Clad Steel. A. L. Schaeffler. *Welding Journal*, v. 29, May 1950, p. 387-390.

Discussion of paper by Perry C. Arnold (Oct. 1949 issue, item 22B-372, 1949) includes description of extensive experimental work. Results of bend tests of simulated two-layer clad welds made in mild-steel plate using different electrodes. Tentative constitution diagrams for weld metal. (K9, M24, CN, SS)

303-K. Welded Fabrication in Heavy Plate. J. B. McCormick. *Welding Journal*, v. 29, May 1950, p. 403-405.

Arc welding and plate shaping equipment and procedures of Pelton Water Wheel Co., Los Angeles. (K1, G1, CN)

304-K. Mechanized Silver Brazing. *Welding Journal*, v. 29, May 1950, p. 405.

(K8)

305-K. Tests of Fillet Welds on Aluminum Alloy 61S-T6 Plate. R. L. Moore and J. M. Pickett. *Welding Journal*, v. 29, May 1950, p. 224s-230s.

Results of static tensile tests of argon-shielded, tungsten-arc transverse and longitudinal fillet welds. (K9, Al)

306-K. Energy Distribution in Electric Welding. C. E. Jackson and A. E. Shrubsall. *Welding Journal*, v. 29, May 1950, p. 231s-241s.

Experimental data show that increased speeds and current result in more efficient utilization of the energy available at the arc in both manual-arc and submerged-melt welding. Losses encountered when using various welding techniques are considered. (K1)

307-K. The Welding of High Nickel Alloys to Other Metals. N. C. Jessen. *Welding Journal*, v. 29, May 1950, p. 241s-242s.

Discusses paper by G. R. Pease and H. B. Bott (Jan. issue; see item 37-K, 1950). Includes authors' reply. (K1, Ni)

308-K. Notch Sensitivity of Welded Steel Plate. L. J. McGeady and R. D. Stout. *Welding Journal*, v. 29, May 1950, p. 243s-251s.

Final report of Welding Research Council's weldability project at Lehigh Univ. Criteria for determining transition temperature, rating notch toughness of structural grades of steel when welded, and effect of constraint during welding on notch toughness, were investigated. (K9, CN)

309-K. Discussion on "The Statistical Part in Welding Investigations". N. L. Navarre and W. E. Clautice. *Welding Journal*, v. 29, May 1950, p. 262s-264s.

Discusses paper by B. B. Day (Oct. 1949 issue, item 22A-235, 1949). Application of statistical planning to evaluation of the "clip test". This test is a weldability field or "spot" test for use in discriminating between those high-tensile steels

which exhibit underbead cracking tendencies and those which do not. (K9, ST)

310-K. Rigid Tests Check Quality of Pressure Welds in Low Alloy Steels. A. I. Nussbaum. *Materials & Methods,* v. 31, May 1950, p. 80-82.

Simulated service and physical tests, and metallographic inspection procedures, used to assure reliable welds of maximum strength in aircraft landing gear. (K2, K9, T24, AY)

311-K. Brazing of Steel. (Concluded.) **Part III. Metallurgy of Brazing.** S. L. Case. *Steel Processing,* v. 36, May 1950, p. 238-243, 257, 265.

Function of brazing flux; nature of bond between base metal and filler alloy; effect of film thickness of filler metal and brazing temperature on joint strength; strength of brazed joints at elevated temperatures; origin of "voids" in brazed joints; detection of "voids"; variables influencing "void" formation; and effect of "voids" on braze quality. 15 ref. (K8, ST)

312-K. Hermetically Sealed Cast-Glass Bushings. T. C. Aitchison and H. Brunton. *General Electric Review,* v. 53, May 1950, p. 39-42.

Development of methods used for joining cast-glass bushings to metal components by soldering, brazing, or welding. Illustrated. (K11)

313-K. Aluminum Brazing. T. J. Palmer. *Metallurgia,* v. 41, May 1950, p. 357-361.

In the fabrication of Al alloys, increasing use is being made of a "brazing" process using an Al-Si eutectic alloy as the joining material. Relative merits of soldering, brazing, and fusion welding. The brazing operation. (K8, Al)

314-K. All-Welded Storage Vessels. *Welding,* v. 18, May 1950, p. 187-198.

Various designs and details of their fabrication. Confined to structural steel. (K1, T26, CN)

315-K. Are We Prisoners of Old Ideas? R. Weck. *Welding,* v. 18, May 1950, p. 223-227.

Lecture contains a number of challenging comments on current ideas of welding design and practice. (K general)

316-K. Determination of the Temperature Field in Welding With the Aid of Measuring Colors. (In German.) A. Matting. *Schweissen und Schneiden,* v. 2, Apr. 1950, p. 68-73.

Variations in temperature gradients with distance from the weld in gas and arc welding of Cu sheets of different thicknesses and of Cu-plated sheet steel were investigated, using colors produced as an indication of temperature zones. Results recorded by color photography, show that thermal diffusion is considerably less in electric-arc welding than in gas welding. 10 ref. (K1, K2, S16, Cu, CN)

317-K. Rubber-Metal Bonding According to the "Megum" Process. (In German.) G. Hanke. *Kautschuk und Gummi,* v. 3, Apr. 1950, p. 126-128.

The various methods for applying adhesives, effect of different components on adhesive strength of the adhesives, and attainable bonding strengths at −45 to 100° C. (K11)

318-K. Calculation of Parameters of Temperature Variations of the Base Metal During Multi-Layer Arc Welding. (In Russian.) N. N. Rykalin and I. D. Kulagin. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Feb. 1950, p. 233-248.

How to calculate the thermal cycle during multi-layer arc welding on the basis of theory and experiment. A method for control of the decomposition of supercooled austenite in the recrystallization zone is indicated. Methods of calculation developed constitute a basis for rational selection of conditions of multi-layer welding of low-alloy structural steels. (K1, AY)

319-K. Welding of Zinc Base Alloy Die Castings. Roland H. Ogden. *Welding Journal,* v. 29, June 1950, p. 453-457.

Techniques for repairing die castings by gas welding. 10 ref. (K2, Zn)

320-K. The Aircomatic Welding Process. A. Muller, G. J. Gibson, and E. H. Roper. *Welding Journal,* v. 29, June 1950, p. 458-482.

Fundamentals of metal-arc transfer in inert-gas-shielded arc welding. Methods of overcoming porosity in Al welding by automatic and manual welding, as well as stainless steel, heat resisting alloys, clad materials, and aluminum bronze. Specific applications. 13 ref. (K1, Al, SS, SG-h)

321-K. Trends in Fabrication by Welding. S. V. Williams. *Welding Journal,* v. 29, June 1950, p. 483-487.

Selection of materials, design, fabrication procedures, production schedules, testing, and cost accounting. (K general)

322-K. Production Butt and Flash Welding. H. J. Chamberland. *Welding Journal,* v. 29, June 1950, p. 488-490.

Automatic control of welding cycle and selective annealing heats for saw bands and steel tape. (K3, AY)

323-K. Welding Galvanized Iron. F. J. Pilia. *Welding Journal,* v. 29, June 1950, p. 491-492.

Welding with regard to protection of the Zn coating. (K general, Zn, Fe)

324-K. Shrinkage Distortion in Welding. W. Spraragen and W. G. Ettinger. *Welding Journal,* v. 29, June 1950, p. 292s-294s.

Systematizes information available in the literature in the form of charts and formulas with suitable correction factors. (K general)

325-K. A Torsion Test for Spot Welds. *Welding Journal,* v. 29, June 1950, p. 302s.

Apparatus and procedures for carbon steels having a tensile strength of 64,000 psi. (K2, Q1, CN)

326-K. Aircomatic Welding—A Production Tool. *Western Machinery and Steel World,* v. 41, May 1950, p. 106-107.

Automatic inert-gas shielded-arc welding of Al, Al bronze, stainless steel and other metals and alloys. (K1, Al, Cu, SS)

327-K. Stud Welding Lowers Costs as New Uses Are Found in Western Manufacture. Ludwig B. Kellerman. *Western Metals,* v. 8, May 1950, p. 26-28.

Stud welding at Ajax Boiler Co., Los Angeles. (K1, T25, ST)

328-K. The Induction Heater as a Tool in Fabrication. Gilbert C. Close. *Finish,* v. 7, June 1950, p. 19-21, 64.

Use of induction brazing in fabrication of miscellaneous products. (K8)

329-K. Weldability of Piping Materials. *Heating Piping & Air Conditioning,* v. 22, June 1950, p. 78-81.

Characteristics of carbon steel, alloy steel, Al, Cu, Ni, and Pb piping materials which affect their welding. (K9, AY, CN, Al, Cu, Ni, Pb)

330-K. Modern Soft-Soldering Technique. R. W. Hallows. *Wireless World,* v. 56, June 1950, p. 217-219.

Soldering of electrical apparatus, which depends upon flux, suitable Sn-Pd solder, and temperature. (K7, T1)

331-K. Evaluation of Several Adhesives and Processes for Bonding Sandwich Constructions of Aluminum Facings on Paper Honeycomb Core. H. W. Eickner. *National Advisory Committee for Aeronautics,* Technical Note 2106, May 1950, 23 pages.

Tension tests were made at 80 and 200° F. on sandwich specimens of 1-in. 17S-T4 Al alloy cubes bonded to a resin-impregnated paper honeycomb core; 6 of 14 bonding processes gave good-quality bonds. Four processes giving the best results were used in a further investigation to determine the effect of amount of adhesive spread on tensile strength. All produced good joints between facing and core when moderately heavy spreads were applied to both. (K11, Al)

332-K. Holdings in the A. F. Davis Welding Library. Robert S. Green. *Engineering Experiment Station, Ohio State University,* Circular No. 51, 1950, 37 pages.

(K general, A10)

333-K. From a Metallurgist's Notebook: Faulty Brazing. H. H. Symonds. *Metal Industry,* v. 76, May 12, 1950, p. 385, 389.

Domestic copper hot-water boilers which were found to be leaking at a brazed joint were investigated. From sections taken through various regions, it was found that failure was due primarily to faulty brazing. An increase in the amount of overlap on the joints is also suggested. (K8, R4, Cu)

334-K. Electric Welding of Copper and Its Alloys. (In German.) Ernst Hawlik. *Schweisstechnik,* v. 4, Mar. 1950, p. 29-32.

A brief outline for the practicing welder. (K1, Cu)

335-K. Automatic Welding Under Flux of "Chromansil" Steel of 2, 3, and 4-Mm. Thicknesses. (In Russian.) N. T. Azarenko. *Avtogennoe Delo* (Welding), Feb. 1950, p. 1-4.

Experimentally investigated for a steel containing 0.32% C, 0.99% Si, 0.04% Mn, 0.018% S, 0.03% P, and 0.86% Cr. Optimum flux material, electrode wire, and welding conditions. It was found that butt joints on copper and steel backing show best characteristics for 3 and 4-mm. thickness, and steel backing for the 2-mm. thickness. Mechanical properties of the welds and weld macrostructures. (K1, AY)

336-K. Manual and Automatic Argon-Arc Welding of Thin "30KhGSA" Sheet Steel. (In Russian.) A. Ya. Brodskii and A. V. Petrov. *Avtogennoe Delo* (Welding), Feb. 1950, p. 14-18.

Experimental investigation of various factors involved in argon-arc welding techniques. Includes study of joint design, of additions of diatomic gases, of electrode compositions, and of welding conditions. Mechanical properties of the welds and optimum techniques. (K1, AY)

337-K. Strength of Seams Resulting From Manual Arc Welding With Deep Penetration. (In Russian.) Ya. M. Likhtarnikov. *Avtogennoe Delo* (Welding), Feb. 1950, p. 18-21.

Physical and mechanical properties of welds in steel obtained with different welding techniques, electrode compositions, and thicknesses of base metal are tabulated and charted. (K1, Q general, ST)

338-K. "We Built a Boat". Harry W. Pierce. *Welding Engineer,* v. 35, June 1950, p. 17-22.

Fabrication of a yacht with a welded steel hull.
(K general, T22, CN)

339-K. Welding, Brazing, Soldering Beryllium Copper. I. John T. Richards. *Welding Engineer,* v. 35, June 1950, p. 23-27.

Physical and mechanical properties, heat treatments, soft soldering, and types of solders and fluxes. Effect of heat on microstructure. (To be continued.) (K7, J general, P general, Q general, Cu)

340-K. Defects in Stainless-Steel Spot Welds. Paul F. Duvall, Robert S. Smith, and Frank E. Craig. *Welding Engineer,* v. 35, June 1950, p. 30-31, 35.

Setup found acceptable by I-T-E Circuit Breaker Co. for producing quality welds. (K3, SS)

341-K. Production Hard-Facing of Rock Drills. Gerald Eldridge Stedman. *Welding Engineer,* v. 35, June 1950, p. 32-35.

Welding and hard facing procedures used by Gardner-Denver Co. (K general, L24, T6, ST)

342-K. Inlays Welded on Old Turbine. *Welding Engineer,* v. 35, June 1950, p. 43.

Repair of old stainless steel turbine runner where the trailing edges of the buckets were pitted. (L24, T25, SS)

343-K. Weld Defect Chart. *Welding Engineer,* v. 35, June 1950, p. 49.

Typical defects found in spot welding austenitic stainless steels, and prevalent causes for their occurrence in order of their importance. (K3, SS)

344-K. Aluminum Welding by Argon Metal Arc. *Petroleum Refiner,* v. 29, June 1950, p. 134.

An electric welding process in which the arc is maintained in a shield of argon gas between a filler metal electrode and the Al workpiece. (K1, Al)

345-K. All Welded Utility Trailer. Bruce M. Smith. *Industry & Welding,* v. 23, June 1950, p. 22-24.

Design and procedure used in fabricating trailer for domestic use. (K general, T21, CN)

346-K. Inert-Gas Shielded-Arc Welding in the Automotive Industry. R. H. Bennewitz and J. J. Pilia. *Industry & Welding,* v. 23, June 1950, p. 26-27.

Use for body parts. (K1, T21, ST)

347-K. Atomic-Hydrogen Welding in the Salvage and Repair of Tool Steels and Dies. Robert L. Kohlbry. *Industry & Welding,* v. 23, June 1950, p. 28, 30.

Procedure and results. (K1, TS)

348-K. The Ability of this "Transportainer" To Safely Carry Six Tons of Cargo Proves that Spot Welded Primary Structural Members Are Dependable. C. Broner. *Industry & Welding,* v. 23, June 1950, p. 32-34.

Weld fabrication of low-alloy steel shipping containers at Dravo Corp. Some experimental work has been done on aluminum.
(K general, T10, AY, Al)

349-K. Welding Hits the Road. A. H. Homrighaus, Jr. *Industry & Welding,* v. 23, June 1950, p. 36-37, 60.

Use of oxy-acetylene, metallic-arc and inert-gas shielded-arc welding in fabricating aluminum trailer and semi-trailer trucks. (K1, K2, T21, Al)

350-K. The House That Jack Built. J. B. McCormick. *Industry & Welding,* v. 23, June 1950, p. 41, 44, 47.

Five-room house with a welded steel frame. (K general, T26, CN)

351-K. The Control of Distortion in Arc Welding. R. G. Braithwaite. *Transactions of the Institute of Welding,* v. 13, Apr. 1950, p. 64-70.

For mild steel structural assemblies. Electrodes, butt welding, balancing welding, glanding, shrinkage in plate girders, and thermal properties of steel. (K1, T26, CN)

352-K. Preliminary Tests on Welded Connections. E. K. Frankl. *Welding Research,* v. 4 (bound with *Transactions of the Institute of Welding,* v. 13), Apr. 1950, p. 27r-32r.

Reviews the literature and describes testing procedure suitable for the examination and testing to destruction of full-scale beam-to-column connections. A few selected types were investigated. 20 ref.
(K9, CN)

353-K. (Book) Fasteners Data Book. 200 pages. 1950. Industrial Fasteners Institute, 3648 Euclid Ave., Cleveland 15, Ohio. $3.75.

Consists of reprints of the more important articles which have appeared in *Fasteners.* Topics include bolt and rivet design, locknuts, strength tests on various fasteners,

proper torque in bolt tightening, and related subjects. (K13)

354-K. (Book) **Resistance Welding in Mass Production.** A. J. Hipperson and T. Watson. 278 pages. Iliffe & Sons Ltd., Dorset House, Stamford St., London S.E. 1, England. 21s. ($4.75)

Covers first principles of each process to its scientific application in mass production. Selection of various processes—pot, projection, seam, flash and butt welding; hot riveting; control equipment for resistance welders; recommended machine settings; testing and inspection of welded joints; and resistance welding costs. Includes bibliography. (K3)

355-K. (Book) **Questions and Answers on Electric Arc Welding.** E. Crawford. 112 pages. George Newnes, Ltd., Tower House, Southampton St., Strand, London W.C.2, England. 5s.

A pocket-sized handbook containing information in the form of answers to everyday questions. (K1)

356-K. Metlbonding Saves Time, Money on B-36. *Aviation Week,* v. 52, June 19, 1950, p. 20-22, 25-26.

New Convair adhesive development which speeds production of superbomber's skin assemblies. (K12, T24)

357-K. "Stored Energy" Welds Dissimilar Metals. A. H. Allen. *Steel;* v. 126, June 26, 1950, p. 72-73.

New gun technique and apparatus by which studs up to ½ in. diameter are joined to base metals of a wide variety of types and thicknesses. Readily adapted to mass production processes, the technique requires no special metal preparation or fluxes. (K1)

358-K. Multi-Arc Welding of Thin Sheet. *Metal Progress,* v. 57, June 1950, p. 808, 810, 814, 816. Translated and condensed from "Multiarc Welding", K. V. Zvegintseva.

Previously abstracted from *Avtogennoe Delo.* See item 22B-447, 1949.

359-K. Brazing and Soldering of Metals Accomplished by Induction Heating Methods. *Materials & Methods,* v. 31, June 1950, p. 63-66.

Typical setups for medium and small-lot production. Tables give compositions and melting points of various Sn-Pb soft solders and of silver brazing alloys. (K7, K8, Sn, Pb, Ag)

360-K. Efficient Flux Recovery Saves Money. *Industry & Welding,* v. 23, July 1950, p. 20-21, 65.

Describes and illustrates various flux-recovery installations. In both manual and automatic hidden-arc welding, the arc is hidden under a mound of granular inorganic flux, only one-third of which is used in the particular weld. (K1, A8)

361-K. Kodak and Welding. Henry H. Brown. *Industry & Welding,* v. 23, July 1950, p. 22-23, 26, 64.

Varied applications of welding at Eastman Kodak Co., mainly in the fabrication of tanks, reaction vessels, and other equipment. (K general, T29)

362-K. Argon Vs. Helium in Inert Atmosphere Arc Welding. Paul Paquin. *Industry & Welding,* v. 23, July 1950, p. 24, 50-51.

Pros and cons of the two gases. (K1)

363-K. Silver Brazing With Induction Heat at Oneida, Ltd. Stewart M. Hill and Richard A. Gehr. *Industrial Heating,* v. 17, June 1950, p. 972-974, 976.

Equipment and procedures for joining stainless steel knife blades to hollow handles. (K8, SS)

364-K. New Welding Techniques Improve Product Quality and Lower Cost. Hugo W. Hiemke. *Western Metals,* v. 8, June 1950, p. 33-34.

Various new techniques and their applications. (K general)

365-K. Arc Welding in Machine Construction. R. G. Alison. *Canadian Metals,* v. 13, June 1950, p. 32-34, 37.

Advantages, applications, and costs, as applied to mild and low-alloy steels. (K1, ST)

366-K. A Survey of Modern Theory on Welding and Weldability. (Continued.) D. Seferian. *Sheet Metal Industries,* v. 27, May 1950, p. 435-444.

Investigation of weld structures; practical application of thermal analysis; the fusion zone; the parent metal; structural changes in the parent metal; physical and chemical changes; qualitative definition of weldability; and determination of weldability. Concerned only with steels. 50 ref. (To be continued.) (K9, ST)

367-K. Automatic Welding of Aircraft Storage Containers by the Submerged-Arc Process. A. I. Nussbaum. *Sheet Metal Industries,* v. 27, June 1950, p. 533-535.

Procedures at Goodyear Aircraft Corp., Akron, Ohio. Sheet steel is used. (K1, CN)

368-K. The Use of Welding in the Construction of Public Cleansing Vehicles. *Sheet Metal Industries,* v. 27, June 1950, p. 540-542.

As applied to dump trucks by British firm. (K general, T21, CN)

369-K. Brazing and Welding Coated Materials. E. V. Beatson. *Welding,* v. 18, June 1950, p. 232-242.

Techniques for brazing various types of metal-coated materials; also resistance welding methods. 11 ref. (K8, K3)

370-K. The Inspector's Approach to Arc Welding. C. W. Ephithite. *Welding,* v. 18, June 1950, p. 255-260.

Fillet welds, deep-penetration welds, square-butt welds, and automatic welding. Common defects and points to be watched. (K1, S general)

371-K. Welding Drawn Shells to Aluminum Diecastings. *Iron Age,* v. 165, June 29, 1950, p. 82.

Spot welding procedure used in fastening the drawn 3S Al spinner shell to the spinner bottom of diecast 307 Al alloy, in assembly of portable washing machines. (K3, Al)

372-K. Stud Welding Tannery Comb Teeth. *Iron Age,* v. 165, June 29, 1950, p. 82.

Special setup for economical production of a new hair combing and drying machine for tannery use. 30,000 pins on 36 rolls carry hair in a continuous thin layer through each machine. (K1, CN)

373-K. Sealing Solder. G. S. Phipps. *Bell Laboratories Record,* v. 28, July 1950, p. 295-297.

New technique used for sealing cracks in wiped joints in lead cable. A supplementary layer of a lower melting solder (52.5% Bi, 32% Pb, and 15.5% Sn) fills the cracks in the wiping solder (34.5% Sn, 1.25% Sb, 0.11% As, balance Pb), forming a good seal. Crack structure and probable sealing action of solder. (K7, Pb, Bi, SG-f)

374-K. Weld Without Flash. Charles Bruno and G. W. Birdsall. *Steel,* v. 127, July 10, 1950, p. 86-87, 102.

Advanced flash-welding technique opens applications for aluminum previously considered impractical or economically impossible because of high fabrication costs. Equipment of improved design reduces the weld-zone, width to 0.006-0.010 in. hence practically eliminating flash and the problem of removing it. (K3, Al)

375-K. Stress-Relieved Brazing Rings Cut Assembly Costs. John Evans. *American Machinist,* v. 94, July 10, 1950, p. 109.

Nondistorting silver solder preforms and use of induction heating reduce rejects, show enormous increases in production over manual brazing in production of strainer assemblies for household refrigerators. (K8, T10)

376-K. Arc Welds Can Be Enameled Successfully. A. N. Kugler. *Ceramic Industry,* v. 55, July 1950, p. 65, 67.

Use of low-hydrogen electrodes for arc welding gives reasonable assurance that delayed flaking and blistering of enamel will not occur. Results of comparative experiments with various types. (K1, L27, CN)

377-K. Stresses in Glass-Metal Seals: I. The Cylindrical Seal. F. W. Martin. *Journal of the American Ceramic Society,* v. 33, July 1, 1950, p. 224-229.

Consideration of the effects of viscous flow during cooling of a beaded wire seal following annealing treatment leads to a refinement of the theory of Hull and Burger. With the corrections provided, excellent correlation is obtained with experimental stress measurements. Cylindrical seals with metal as the external member. (K11)

378-K. Weld 3850-Ton Mechanical Press. Clyde B. Clason. *Welding Engineer,* v. 35, July 1950, p. 17-20.

Procedures and equipment used by Clearing Machine Corp., Chicago. (K general, T5, CN)

379-K. Building a Bull Gear. *Welding Engineer,* v. 35, July 1950, p. 21.

Use of submerged-melt welding in production of bull gear from 5/8-in. plate and 1-in. thick strip for the rim. (K1, T7, CN)

380-K. How Chevrolet Welds the "Powerglide". Stanley H. Brams. *Welding Engineer,* v. 35, July 1950, p. 22-24.

Various steps, including electric welding, spot welding, and brazing. (K1, K3, K8, T21, ST)

381-K. Big Diesel Repair Job. *Welding Engineer,* v. 35, July 1950, p. 25.

Arc welding repair of large break in 800-hp. diesel. (K1, T25, CN)

382-K. Low-Cost Welded Stadium. R. G. Swisher. *Welding Engineer,* v. 35, July 1950, p. 32-33.

Arc-welded steel grandstands made by Pittsburgh-Des Moines Steel Co. Patented design utilizes standard units. (K1, T26, CN)

383-K. Welded Portable Repair Shop. Charles W. Harbaugh. *Welding Engineer,* v. 35, July 1950, p. 34-35.

(K general, T5, CN)

384-K. Solvent Extractor Stud Welded. *Welding Engineer,* v. 35, July 1950, p. 42.

How welding 2500 threaded studs to frame members of stainless-steel equipment eliminated time-consuming drilling and tapping, and sharp-

ly reduced the amount of stainless needed. (K1, SS)

385-K. Hints for White Metal Welding. *Linde Tips,* and *Oxy-Acetylene Tips,* v. 29, July 1950, p. 53-56.
Recommended procedures. (K2, Sn, Pb, Sb)

386-K. Argon Arc Welding. *Light Metal Age,* v. 8, June 1950, p. 14-15.
Commercial practice as applied to aluminum. (K1, Al)

387-K. Solid-Phase Hot Pressure Welding. Gilbert C. Close. *Finish,* v. 7, July 1950, p. 19-21, 73-74.
Process and some equipment used for specific jobs. Basic advantages and applications. Mentions only use for joining various steels. (K2, SS)

388-K. Engineering Trends in Spot Welder Controls. Stuart C. Rockafellow. *Electronics,* v. 23, July 1950, p. 70-73.
Techniques for building electronic controls that meet reliability and quick-repair requirements of auto-industry assembly lines. Details of 6-thyratron timer circuit having potentiometer control of time for each sequenced function of a resistance welder. (K3)

389-K. New Aluminium-Silicon Electrode. *Light Metals,* v. 13, June 1950, p. 352-354.
Use of Al-Si electrode, developed by a British firm, for welding of wrought alloys of specifications AW3, 9, and 10. (K1, T5, Al)

390-K. Welding and Cutting on the Sea Defence Works, Lowestoft. *Welder,* v. 19, Jan.-Mar. 1950, p. 2-5.
(K general, G22, CN)

391-K. Spotlight on Arc Welding. V. Winget Ltd., Rochester. *Welder,* v. 19, Jan.-Mar. 1950, p. 10-14.
Use by British firm in construction of civil-engineering equipment and concrete machinery. (K1, T4, CN)

392-K. The Design and Fabrication of Welded Structures Subjected to Repeated Loading. Part IV. R. Weck. *Welder,* v. 19, Jan.-Mar. 1950, p. 15-24.
Dynamic notch sensitivity of materials and fatigue strength of riveted and welded joints. Fatigue-test data for various welded cast irons and steels and various joint designs. (To be continued.)
(K9, Q7, ST, CI)

393-K. The Pressure-Welding Characteristics of Some Copper-Base Alloys. Edwin Davis and Eric Holmes. *Journal of the Institute of Metals,* v. 77, May 1950, p. 185-206.
Pressure welding characteristics of deoxidized copper and 9 commercial Cu-base alloys were determined by tensile testing and micro-examination of butt welds. Joint strength was influenced by surface condition before welding, mechanical preparation proving most suitable, and by deformation taking place during welding. Welding time, pressure, and temperature were of importance only in so far as they affected deformation, provided that welding temperature exceeded recrystallization temperature of the material. Order of weldability. 12 ref. (K2, Cu)

394-K. Copper Brazing of Case Hardening Steel. S. C. Churchill. *Machinery* (London), v. 76, June 22, 1950, p. 884-889.
Effects of the brazing temperature on case-hardening steel subjected to a variety of subsequent heat treatments. The specimens were tested for Izod impact and Vickers hardness. Recommendations. (K8, J general, Q6, Q29, CN)

395-K. French Automatic Spot-Welding Machines. (In French.) J. Négre. *Soudure et Techniques Connexes,* v. 4, Jan.-Feb. 1950, p. 5-15.
Different types especially developed for existing industrial conditions in France. Low operating costs, independent of the amount of work performed. Electrical circuits and equipment. (K3)

396-K. Welding-on of Pins by Means of a Welding Gun. (In French.) J. Sarazin. *Soudure et Techniques Connexes,* v. 4, Jan.-Feb. 1950, p. 17-25; discussion, p. 25-28.
Method and apparatus for joining studs, bolts, pins, etc., of a wide variety of shapes and sizes to plane or curved surfaces. Assemblies utilizing numerous such joints. Results of uniaxial and biaxial tensile testing of typical joints. (K1)

397-K. Welding and Brazing by High-Frequency Current. (In French.) M. Descarsins. *Soudure et Techniques Connexes,* v. 4, Mar.-Apr. 1950, p. 65-75.
Application of the method of high-frequency induction heating to welding and brazing. Principles of this method; advantages and disadvantages; equipment. (K6, K8)

398-K. Tendency Toward Crack Formation of Light-Alloy Welded Structures. (In French.) Marc Hollard. *Revue de Métallurgie,* v. 47, Apr. 1950, p. 287-294.
Use of the method of Bollenrath and Cornelius for determination of cracking. Application of this method to different types of light alloys, including the technique of the procedure. Data of a typical test. 11 ref. (K9, Al)

399-K. Crack Sealing Torch; Its Use in the Fabrication of Special Steels. (In French.) Charles Marizy. *Revue de Métallurgie,* v. 47, May 1950, p. 395-398.

Its use for elimination of surface defects such as small cracks, blisters, scales, etc., in ingots of carbon and low-alloy steels. Method of use is described. (K2, CN, AY)

400-K. Wide-Seam Forehand Welding. (In French.) C. G. Keel. *Revue de la Soudure; Lastijdschrift,* v. 6, no. 1, 1950, p. 1-19.

Forehand welding using an appropriate weld metal and following with a short-time torch heat treatment at a temperature above the Ac_3 point. Optimum conditions of operation. Results of an extensive study of mechanical properties and structural characteristics of the welds. (K2, CN)

401-K. Induction Soldering Process. (In German.) G. W. Seulen. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, May 11, 1950, p. 337-340.

Equipment and advantages. (K7)

402-K. Determination of the Suitability of Low-Carbon Steels for Fusion Welding. (In Czech.) Frantisek Poboril and Frantisek Sicha. *Hutnické Listy,* v. 5, Jan. 1950, p. 5-9; Feb. 1950, p. 57-61; Mar. 1950, p. 101-105.

On the basis of experimental evidence showing that in fusion welding, a sudden cooling down of certain low-carbon steels from temperatures in the vicinity of the Ac point results in a brittle zone in the transition range, a fusion-weldability test for steels was suggested. It consists in the quenching of a rough-machined impact-test specimen from a temperature just below the Ac_1 point, artificial aging at 100° C. for two hours, and determination of impact strength at the normal temperature. (K9, CN)

403-K. Argon-Arc Welding in Production of Thermostatic Elements. (In Russian.) A. Ya. Brodskii. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Feb. 1950, p. 37-40.

Technique using a tungsten electrode, developed as a result of experimental investigations. This method is also applicable to production of similar devices (membranes, diaphragms, aneroid capsules) having a right-cylindrical shape. Mechanical device to automatize welding is described and structural details are diagrammed. Material welded is 18-8 stainless steel. (K1, SS)

404-K. Progress in Development of Automatic Welding Under Flux During the Last Two to Three Years. (In Russian.) E. O. Paton and B. I. Medovar. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Feb. 1950, p. 28-36; Mar. 1950, p. 31-42.

Russian research as applied to carbon and low-alloy structural steels. Methods of stress relief, applicable mechanical tests and low-temperature applications (down to −45° C.). Second part: New equipment, tables, diagrams, and illustrations. (K1, ST)

405-K. Welding of Steels at Low Temperatures. (In Russian.) A. A. Chekanov. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Mar. 1950, p. 45-48.

Four different structural steels were welded at −40 to 18° C. and tested at −40° C. and room temperature. Mechanical properties were studied, as well as tendency toward crack formation. Method of investigation. (K general, CN)

406-K. Reaction of Phosphorus and Sulfur During Automatic Welding Under High-Manganese Fluxes. (In Russian.) K. V. Lyubavskii and M. M. Timofeev. *Avtogennoe Delo* (Welding), v. 21, Mar. 1950, p. 5-11.

Results of several independent investigations of the reaction of phosphorus and sulphur both during melting of the flux and in the molten-metal pool formed at the point of welding. It was found that a P content of 0.13-0.15% causes an increase of content of this element in the weld metal by 0.020-0.025%. Methods of reducing P content of flux to 0.03-0.07%. Mechanism of transition of S from flux slag to weld, causing hot cracks, and methods for its elimination. 18 ref. (K general, ST)

407-K. Conditions for Intermittent Spot Welding. (In Russian.) I. P. Trochun and G. V. Vasil'ev. *Avtogennoe Delo* (Welding), v. 21, Mar. 1950, p. 11-14.

Method of welding characterized by interrupted application of the welding current, necessitated by a difference in the rate of heat transfer into the interior of the sheet and the rate of heat escape from the surface of the sheets through the electrodes. This method is recommended for low-carbon steel sheets of 3-10 mm. thickness. Special advantages. Optimum conditions of welding for different cases. (K3, CN)

408-K. Weld Assembly of Steel Framework of High Buildings. (In

Russian.) M. M. Sakhnovskii and A. D. Zevin. *Avtogennoe Delo* (Welding), v. 21, Mar. 1950, p. 18-19.

Possibility of attaching horizontal braces to the body of columns in the framework of high buildings without use of the "overhead" welding position. Optimum gap between brace and column is indicated. Steel backings were found more applicable than asbestos or copper. (K general, T26, CN)

409-K. Electrical Characteristics of Spot Welding Machines and Their Influence on the Stability of the Welding Process. (In Russian.) L. V. Glebov. *Avtogennoe Delo* (Welding), v. 21, Mar. 1950, p. 29-30.

Determining relation between various parameters of the machine and welding stability. Formulas developed are thoroughly discussed and verified experimentally. (K3)

410-K. Important Points To Consider in Welding Aluminum. Fritz Albrecht. *Machinery* (American), v. 56, July 1950, p. 168-170.

Selection of filler material, nature of material to be joined, and factors affecting welding methods. (K general, A1)

411-K. Applications for Helium in Inert-Arc Welding. M. J. Conway. *Welding Journal,* v. 29, July 1950, p. 533-536.

Historical review stresses the advantages of helium in inert-gas shielded-arc welding and its promising future. (K1)

412-K. Portable Resistance-Welding Tools. Charles H. Davis, Jr. *Welding Journal,* v. 29, July 1950, p. 537-541.

Various types of equipment. Coordination of product and design, other considerations affecting design, materials for tool construction, and tool supports. Practical shortcuts. (K3, T5)

413-K. Shielded Arc Welding of Aluminum. Fritz Albrecht. *Welding Journal,* v. 29, July 1950, p. 542-546.

Typical argon-shielded, a.c. arc welding operations on aluminum and savings realizable in comparison with oxy-hydrogen torch welding. (K1, A1)

414-K. Slope Control and Its Effect on Spot Welding. J. L. Solomon. *Welding Journal,* v. 29, July 1950, p. 578-579.

Discusses paper by Ivar W. Johnson (Oct. 1949 issue, item 22A-238, 1949). Shows that, although addition of slope control to a single-phase welder allows one to simulate the heating effect produced naturally by the 3-phase welding current, the welding of Al to ANW-30 specifications requires also addition of current-decay control. This latter control allows the spot to cool at a slow rate, minimizing porosity, sheet separation, and internal cracks. (K3, A1)

415-K. Resistance Welding Hot Air Heating Chamber. H. W. Stieglitz. *Welding Journal,* v. 29, July 1950, p. 580-582.

Equipment and procedures for welding chamber used in gas furnaces, at high production rates. The chamber consists of three closely spaced sections linked by a number of tubular flues. (K3, T27, ST)

416-K. Automatic High-Speed Welding of Small-Diameter Joints. *Welding Journal,* v. 29, July 1950, p. 582.

Equipment and procedure for attaining high-production speeds yet sound joints in the arc welding of universal yokes to each end of 2¾-in. diam. automobile shafts. (K1, T21, ST)

417-K. How To Fusion Weld Cast Iron. F. C. Geibig. *Welding Journal,* v. 29. July 1950, p. 583-587.

Recommended procedures for the repairman for the three types (white, gray, and malleable) on both small and large parts. (K2, CI)

418-K. Shrinkage Distortion in Welding. W. Spraragen and W. G. Ettinger. *Welding Journal,* v. 29, July 1950, p. 323s-335s; discussion, p. 335s.

Reviews and correlates literature from Jan. 1, 1944 to July 1, 1949 (foreign literature from Jan. 1, 1941). Includes brief comment by H. Weisberg. 33 ref. (K general)

419-K. Underbead Cracking of Welds Cathodically Charged With Hydrogen. M. W. Mallett and P. J. Rieppel. *Welding Journal,* v. 29, July 1950, p. 343s-347s.

Most of the tests were made on heat treated Mn-Mo steel. A few tests were made on 18-8 stainless steel plate, ship-plate steel "as-received", and on homogenized samples of Mn-Mo steel and ship plate. Procedure and results. Proposes a theory of underbead cracking. 14 ref. (K9, ST, AY)

420-K. Mechanical and Material Variables Affecting Correlation. Carl E. Hartbower and William S. Pellini. *Welding Journal,* v. 29, July 1950, p. 348s-360s.

Mechanical and material variables which affect correlation of performance between small-scale specimens and complex structures were studied. Relative performance of welded and unwelded V-notch Charpy and nick-bend specimens was compared with that of welded 9-ton box girders. Complex interplay of mechani-

cal and material variables precludes correlation except in a very approximate sense. Numerous graphs, tables, diagrams, and illustrations. (K9, CN)

421-K. Corrosion Resistant Liners in Refinery Vessels. G. C. Carpenter. *Petroleum Refiner,* v. 29, July 1950, p. 95-103.

See abstract of "New Techniques for Lining Vessels for Protection Against Corrosion", *Petroleum Processing,* item 51-K, 1950. (K1, T29, SG-g)

422-K. Fast Welding Stops Rejects. *Product Engineering,* v. 21, July 1950, p. 92-93.

In production of household water filter, argon-shielded arc welding is now used in place of silver brazing for joining stainless steel. (K1, SS)

423-K. Copper Paste Lowers Brazing Costs. Dan Reebel. *Steel,* v. 127, July 17, 1950, p. 82-83, 98.

National Cash Register method provides tighter joints, increased furnace production, and requires less hand labor. Savings range up to $3.15 per 100 on business-machine parts. The paste consists of a jellied petroleum material of low ash content, containing red Cu oxide in a fine state of subdivision. (K8)

424-K. Effect of Welding on Pressure-Vessel Steels. A. F. Scotchbrook, L. Eriv, R. D. Stout, and B. G. Johnston. *Transactions of the American Society of Mechanical Engineers,* v. 72, July 1950, p. 539-548.

Results of a study using the Lehigh slow notched-bend test to determine the effects of welding on as-received and prestrained plate. Effects of different heat inputs in welding, of plate thickness, of carbon content and deoxidation practice, and of heat treatment after welding. Six plain carbon steels were tested. (K9, Q5, T26, CN)

425-K. Welding, Brazing, Soldering Beryllium Copper. II. John T. Richards. *Welding Engineer,* v. 35, July 1950, p. 36-39, 56.

Recommended procedures for high and low-temperature silver brazing and resistance welding. Table gives effects of low-temperature silver brazing on hardness of Be-Cu strip subjected to a wide variety of annealing, cold-rolling, and aging schedules. (To be concluded.) (K general, Cu)

426-K. Assessment of Welding. J. Derrix. *Welding,* v. 18, June 1950, p. 261-264.

Weld efficiency and design, especially in relation to certain classes of pressure vessels. Unless the true value of a sound weld is better appreciated, a danger exists that the low design values at present in force will hinder the extended use of weld fabrication. (To be continued.) (K9)

427-K. (Book) **Electric Resistance Welding.** H. E. J. Butler. 173 pages. George Newnes, Ltd., Tower House, Southampton St., Strand, London W.C. 2, England. 17s., 6d.

All the main resistance welding processes namely, spot, seam, projection and butt welding. Does not cover hot riveting, electrical resistance brazing, and bar heating. Elementary principles of welding, the types of machines available, and electrodes and control gear. Lacks information on the jigs and tools required in mass production. (From review in *Welding.*) (K3)

428-K. (Book) **Gas Welders' Tables and Data.** E. Molloy, editor. 160 pages. George Newnes, Ltd., Tower House, Southampton St., Strand, London W.C. 2, England.

Handbook is divided into six main sections; welding equipment, welding methods, oxygen cutting, rods and fluxes, hard surfacing, and miscellaneous. It is mainly based upon manufacturers' data. (From review in *Welding.*) (K2)

429-K. (Book) **Neue Erkenntnisse und Entwicklungen beim Schweissen von Eisenwerkstoffen.** (New Developments and Progress in the Welding of Ferrous Materials). K. L. Zeyen. 214 pages. Carl Hanser Verlag, Munich 27, Germany. 10.80 DM.

Surveys development of arc welding during the war years and the post-war era. One of its main objects is to inform German technicians of the latest developments in Britain and the U. S. Deals with weldability, the fabrication of alloy steels, and recent trends in electrode production. Economies possible by the use of special rolled sections and certain types of joint preparation. Bibliography of over 200 references. (From review in *Welding.)* (K1, Fe)

430-K. Transmission Parts Silver Soldered by Induction Heat. *Steel,* v. 127, July 24, 1950, p. 62. (K7, T1, ST)

431-K. Structural Aluminum Welded by New Process. *American Machinist,* v. 94, July 24, 1950, p. 149.

Application of Aircomatic gun process by Mid-States Ornamental Iron Works, Kansas City, Mo., for high-speed production of structural members of Al awnings. (K1, Al)

432-K. Stem Welding by the Thermit Process. Robert L. Holliday. *Pro-*

ducers Monthly, v. 14, July 1950, p. 24-25.

As applied to oil-well drill stems. (K4, T28, ST)

433-K. Speed and Uniformity in Joining Steel Provided by Contact Welding. T. C. Du Mond. *Materials & Methods,* v. 32, July 1950, p. 55-57.

Process developed by Philips in which the electrode touches the work at all times. It can be used on mild and low-alloy steels, and offers a number of advantages over conventional arc welding. Comparative costs of welds using contact and conventional E6020 electrodes. Graph shows reduction in nitrogen absorption by weld metal during contact welding. (K1, ST)

434-K. Riveting in Production. E. O. Baumgarten. *Western Machinery and Steel World,* v. 41, July 1950, p. 76-79, 84-85.

Diagrams illustrate good and poor design of riveted joints. (K13)

435-K. Mass Production of All-Welded Deep-Drawn Gas Cylinders. A. I. Nussbaum. *Sheet Metal Industries,* v. 27, July 1950, p. 631-632.

Procedures and equipment of Compressed Gas Cylinders, Inc., Los Angeles, Calif. (K general, G4, ST)

436-K. Assembly Time on Terne Plate Tanks Cut by Forty Per Cent. R. D. Wasserman. *Steel,* v. 127, July 31, 1950, p. 73, 75.

Changes in arc welding technique which effected a saving of 43.85 hr. per 100 lead-covered steel tanks. (K1, T26, CN)

437-K. Metallurgical Materials and Problems When Setting Industrial Diamonds. H. L. Strauss. *Industrial Diamond Review,* new ser., v. 10, June 1950, p. 184-185.

The five methods of setting industrial diamonds are: brazing, induction heating, casting, sintering by conventional methods, and sintering by the hot-press technique. Problems accompanying each method. (K8, E general, H15)

438-K. Code of Practice for the Repair and Reclamation of Grey-Iron Castings by Welding and Allied Methods. *Institute of British Foundrymen,* Paper No. 969, 1950, 8 pages (Advance Copy).

Specification of castings, types of defects that can be repaired, factors limiting repair, available methods, and choice of method. Code for reclamation by welding and by "burning on" (special form of welding). (K general, CI)

439-K. Recommended Practice for the Repair and Reclamation of Non-Ferrous Castings. *Institute of British Foundrymen,* Paper No. 970, 1950, 12 pages (Advance Copy).

Repair by burning, welding, brazing, soldering, annealing, impregnation, calking, plating, and metal spraying. Cu and Al base alloys are given as examples. 48 ref. (K general, J23, L general, Al, Cu)

440-K. Progress at Fawley. *Welding,* v. 18, July 1950, p. 280-289.

Welding equipment and procedures in erection of new British oil refinery. (K1, T29, CN)

441-K. Assessment of Welding. J. Derrix. *Welding,* v. 18, July 1950, p. 306-309.

Conclusion emphasizes the need for producing consistent weld quality. Recommended standards. (K general, S22)

442-K. Some Aspects of Fusion Welding for the Chemical and Food-Producing Industries. F. Jukes. *Transactions of the Institute of Welding,* v. 13, June 1950, p. 79-86.

Classification of the various stainless alloys in use, their weldability, and methods of welding those of the austenitic group. Typical products. (K general, T29, SS)

443-K. Safety in the Practice of Welding. E. Fuchs. *Transactions of the Institute of Welding,* v. 13, June 1950, p. 87-94.

The commoner dangers of welding, both by electric arc and oxyacetylene, and the protective equipment necessary. (K1, K2, A7)

444-K. Welding in Boilers. S. H. Griffiths. *Transactions of the Institute of Welding,* v. 13, June 1950, p. 95-103.

Savings of material resulting from the substitution of welding for riveting. Techniques employed in pipeline welding, stud welding, and the production of industrial flooring by projection welding. (K general, T26, ST)

445-K. Recommendations for the Metal Arc Welding of Butt Welds in Steel Pipelines for Power Plant. *Welding Research,* v. 4 (bound with *Transactions of the Institute of Welding,* v. 13), June 1950, p. 40r-46r.) (K1, T4, CN)

446-K. The A.C. Argon Arc Process for Welding Aluminium. The Oscillographic Analysis of the Application of a Commercial High Frequency Spark Injector Unit. L. H. Orton, J. C. Needham, and J. H. Cole. *Welding Research,* v. 4 (bound with *Transactions of the Institute of Welding,* v. 13), June 1950, p. 47r-68r.)

Use of electromagnetic and cathode-ray oscillographic recording techniques for the study of certain elec-

trical parameters in the argon-arc process. Nature of the output from a commercial high-frequency spark-oscillator unit is in relation to its application to this process. Superficial appearance of welds on 5% Mg Al alloy and commercially pure Al, made using different electrical conditions. Cathode-ray oscillograms of arc gap voltage show effects of phase of high-frequency input relative to input of the welding transformer. (K, Al)

447-K. Crack Formation in Light-Alloy Welded Structures. (In French.) Marc Hollard. *Revue de l'Aluminium,* v. 27, May 1950, p. 175-182.

See abstract under similar title from *Revue de Métallurgie,* item 398-K, 1950. (K9, Al)

448-K. Electrolytic Brass Plating of Steel Products for Promoting the Adhesion of Rubber. (In Russian.) A. I. Stabrovskii. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 23, Apr. 1950, p. 370-374.

The quantitative dependence of cohesive force between rubber and brass on the composition of the latter was experimentally investigated. It was found that strongest adhesion is obtained for an electrodeposit containing about 70% Cu and 30% Zn. Thickness variation between 1 and 5 μ has little influence on adhesion. Optimum bath composition and plating conditions were determined. (K11, L17, Cu, ST)

449-K. Electric Welding of Bronze Castings. (In Japanese.) Jiroh Adachi. *Journal of the Casting Institute of Japan,* v. 21, no. 1, 1949, p. 14-29.

Research on welding electrodes and fluxes for repair of bronze castings. It was found that uncoated electrodes are unsatisfactory. Composition of the most suitable flux is 40-50% SiO_2, 20-30% NaOH, and 20-40% $CaCO_3$. Mechanical strength and corrosion resistance of the welds were determined. The best electrode using the above flux was found to contain 84% Cu, 10% Sn, and 6% Zn. (K1, Cu)

450-K. Design Analysis of a Large Weldment. L. G. Hauser. *Engineering Experiment Station News* (Ohio State University), v. 22, June 1950, p. 9-10, 37-38.

As applied to weld-fabricated spider for a water-wheel generator. Cost savings made possible by substitution of this type of construction for cast steel. (K1, T25, CN)

451-K. Some Research Activities Related to Welded Structures. Finn Jonassen. *Engineering Experiment Station News* (Ohio State University), v. 22, June 1950, p. 11-17, 38-42.

A research program which was initiated because of the structural failure of welded ships. This program was started during the war and has been continuing up to the present. 24 ref. (K9, T22, CN)

452-K. Organization and Applications of Maintenance Welding. Lew Gilbert. *Engineering Experiment Station News* (Ohio State University), v. 22, June 1950, p. 18-20, 42-44.

Applications in specific industries. Recommends greater appreciation of potentialities of the various welding processes for repair and maintenance. (K general)

453-K. The Welding of Stainless Steel. George C. Kiefer. *Engineering Experiment Station News* (Ohio State University), v. 22, June 1950, p. 21-24, 44-51.

Includes information on physical and mechanical properties of the welds, response to heat treatment, effect on corrosion resistance, and use of dissimilar welding rods. (K general, SS)

454-K. Application of Contact Welding. A. B. Tesmen. *Engineering Experiment Station News* (Ohio State University), v. 22, June 1950, p. 25-26, 51-54.

Process and equipment developed by Philips in Holland. The electrode is claimed to simplify welding technique, increase welding speed, and improve quality of the welds. Includes comparative cost analysis. (K1)

455-K. Research in Welding Engineering. Robert J. Krieger. *Engineering Experiment Station News* (Ohio State University), v. 22, June 1950, p. 27-28, 54-56.

Outlines some of the more important welding research problems which exist today. Some of these problems have been under almost continuous investigation for many years, others have been studied only intermittently, while still others have just recently been uncovered. (K9)

456-K. Metal Adhesives for Bonding Aircraft Assemblies. *Automotive Industries,* v. 103, Aug. 1, 1950, p. 38-40, 82, 84.

Increasing use of "Metlbond", developed by Convair from two other adhesives, used in separate layers. To date, the process has been used primarily on clad Al alloys and on Mg alloys. It is also applicable to ferrous and to additional nonferrous metals, but processing methods have not been fully investigated. (K12, Al, Mg)

457-K. Commutator Soldering by High Frequency Heating. Loren Jones. *Railway Mechanical and Electrical Engineer,* v. 124, Aug. 1950, p. 452-453, 460.

Simple soldering procedure. (K7, T1, Cu)

458-K. Torch Brazing by Reciprocal Combustion. C. J. Milner. *Journal of Scientific Instruments,* v. 27, July 1950, p. 207.

Technique suitable for brazing of vacuum-tube parts, etc. The phenomenon of reciprocal combustion refers to the apparent burning of a jet of air or oxygen when it issues into a space containing a combustible gas. In this case the work is contained in a chamber filled with hydrogen, while the jet consists of oxygen. (K8)

459-K. Bad and Good Resistance Welding. R. T. Gillette *American Machinist,* v. 94, Aug. 7, 1950, p. 125, 127.

Typical cases. (K3)

460-K. Forging Dies Repaired by Arc Welding. Frank Macho. *American Machinist,* v. 94, Aug. 7, 1950, p. 132-133.

Procedures at Harnischfeger Corp. Low-hydrogen electrodes are used. (K1, T5, TS)

461-K. Joining Hard-To-Weld Metals at High Production Rates. S. D. Baumer. *Machinery* (American), v. 56, Aug. 1950, p. 158-164.

How parts made of stainless steel, aluminum, and Al bronze are rapidly welded in all positions by means of the "Aircomatic" process. Typical applications of this inert-gas-shielded metal-arc welding process. (K1, ST, Al, Cu)

462-K. Perfection Welding. *Industry & Welding,* v. 23, Aug. 1950, p. 20-21, 47.

Various resistance-welding equipment and procedures at Perfection Stove Co., Cleveland. Metals are mild and stainless steels. (K3, T10, ST)

463-K. Know-How Pays Off. *Industry & Welding,* v. 23, Aug. 1950, p. 24-25, 66.

Weld fabrication of steel at Eisler Engineering Co., Newark, N. J. (K general, A5, ST)

464-K. Welding Crews Hit the Desert. James Joseph. *Industry & Welding,* v. 23, Aug. 1950, p. 26-27, 30, 61.

Pipeline electric welding equipment and procedures on Texas-California gas line. (K 1, T29, CN)

465-K. Special Designed Turning Rolls Pay Off as Texas Auto Tunnel Is Fabricated by Turning Toward Welding. *Industry & Welding,* v. 23, Aug. 1950, p. 31-32, 45.

Sections of tunnel wall are made of steel and are 20 ft. in diam. Electric welding of the circumferential seams takes place automatically as the sections are slowly rotated by means of turning rolls on which they rest. (K1, T26, CN)

466-K. Spot Welding Speeds Production. *Industry & Welding,* v. 23, Aug. 1950, p. 34-35, 51.

Use in manufacture of all-steel station-wagon bodies by Fisher Body's Euclid, Ohio, plant. (K3, T21, CN)

467-K. Infrared Weld Preheater. *Industry & Welding,* v. 23, Aug. 1950, p. 48.

Equipment developed for preheating high-tensile steels, especially during cold weather, to prevent crack development in the weld zones. Advantages over conventional preheating methods. (K general, ST)

468-K. Precision Rings Hot Pressure Welded. Gilbert C. Close. *Steel,* v. 127, Aug. 14, 1950, p. 88-89, 111-112.

How support rings for aircraft jet-engine blast tubes, high-pressure metal gaskets, and close-tolerance parts are being formed with success by a direct descendant of the blacksmith's ancient art. Materials used include alloy and stainless steels. (K3, AY, SS)

469-K. Welded Steel Construction Lowers Lift Truck Cost. *Product Engineering,* v. 21, Aug. 1950, p. 106-107. (K1, T21, ST)

470-K. Seven Common Troubles Found in Welding Stainless and Other Alloy Steels. James E. Norcross. *Welding Engineer,* v. 35, Aug. 1950, p. 26-29.

Porosity, micro-cracks, incomplete penetration, convex fillets, undercutting, incomplete slag removal, and "fingernailing", and their causes and remedies. (K general, SS, AY)

471-K. Welding, Brazing, Soldering Beryllium Copper. III. (Concluded.) John T. Richards. *Welding Engineer,* v. 35, Aug. 1950, p. 35-37.

Welding of beryllium copper by carbon-arc, metal-arc, and inert-arc processes. (K1, Cu)

472-K. Three-Phase Welding. J. L. Solomon. *Welding Engineer,* v. 35, Aug. 1950, p. 38-41.

Electrical advantages of resistance welding with the three-phase system which includes lowered demand, power factor above 85%, reduced line currents, uniform heating effects on all three lines and on all three phases. Welding and metallurgical advantages are reduced expulsion of metal, greater tip life,

and less electrode pick-up when welding Al and Mg. (K3)

473-K. New Job for Stud Welding. *Welding Engineer,* v. 35, Aug. 1950, p. 42.

Stainless steel studs of special design are welded to the interior of catalyst regenerators at the Toledo refinery of Sun Oil Co. They are used to support thick insulation and refractory tiles which are used as lining. (K1, SS)

474-K. Silver-Brazing Alloys and Trade Names. *Welding Engineer,* v. 35, Aug. 1950, p. 49.

Comparable trade names used by three firms; compositions; melting and flow points, and specification sources and numbers, for 37 different alloys. (K8, SG-f)

475-K. Stud Welding. *Canadian Metals,* v. 13, July 1950, p. 36.

Use for installing corrugated aluminum roofing and siding at Aluminum Co. of America's new Point Comfort Works. (K1, T26, Al)

476-K. Modern Cable Sheathing Practice; G.E.C. Cold Pressure Welding. *Wire Industry,* v. 17, July 1950, p. 600, 603.

Equipment and procedures for production of Al-sheathed cable, consisting of four stages: flange forming; preparation of flange surfaces; introduction of cable and formation of tube; and pressure welding and removal of flanges. (K5, F26, Al)

477-K. Zinc-Rich Solder for Aluminium; Some Preliminary Tests on Various Compositions. C. W. Roberts. *Metallurgia,* v. 42, July 1950, p. 55-58.

Results of a series of tests on an alloy containing 95% Zn, 5% Al, and with or without 1.01% Ti, indicate that such an alloy is, in several important respects, superior to a number of other alloys recommended for soldering Al. (K7, Al, Zn, SG-f)

478-K. Welding Sheet-Metal Components for Jet Propulsion Units. *Machinery* (London), v. 77, July 20, 1950, p. 79-82.

Equipment and procedures at Pratt & Whitney Aircraft Div., East Hartford, Conn. Metals are chiefly 18-8 stainless and the heat resistant Cr-Ni-Fe alloy known as Nimonic 75. Resistance welding is the principal joining method. (K3, T25, SS, SG-h)

479-K. Welding Carbon Steels and Carbon Steel Castings. J. Lomas. *Machinery Lloyd* (Overseas Edition), v. 22, July 22, 1950, p. 97-99, 101, 103.

Procedures for the various types, grouped according to carbon content. (K general, CN, CI)

480-K. Research on the Criteria of Weldability of Steels. (In French.) *Revue de la Soudure: Lastijdschrift,* v. 6, no. 2, 1950, p. 59-71.

Results of study by a Belgian-Dutch commission concerning test methods (in particular, size and shape of notched test specimens) for determination of applicability of steel for welded structures at low temperatures (−80 to 20° C). Method of comparative testing. (K9, CN)

481-K. Study of the Fatigue Resistance of Welded Structures. (In French.) (To be continued.) W. Soete and R. Van Crombrugge. *Revue de la Soudure; Lastijdschrift,* v. 6, no. 2, 1950, p. 72-82.

Studies in a plain-carbon steel. Method of investigation, conditions of welding, apparatus used, and different types of test specimens used. (K3, Q7, CN)

482-K. Shrinkage and Shrinkage Phenomena Resulting From Arc Welding. (In French.) H. E. Jaeger. *Revue de la Soudure; Lastijdschrift,* v. 6, no. 2, 1950, p. 83-95.

Influence of certain factors; such as type of electrodes used, rate of welding, rate of cooling, etc., on degree of shrinkage (longitudinal and transverse) of steel. Method of investigation, including apparatus and test specimens. (K1, CN)

483-K. The Bonding of Metals With Sodium-Phenol Resins. (In German.) Joh. F. Ehlers. *Kunststoffe,* v. 40, May 1950, p. 151-157.

Extensive tensile strength measurements of metals joined with this adhesive were made in order to study the effects of external conditions on joint strengths. Effectiveness of this adhesive is explained by formation of compounds from the oxides or hydroxides of the metals and the chain molecules of the "resins". (K12)

484-K. Spot Welding of Thick Steel Parts With Low-Frequency Current. (In Russian.) A. S. Gel'man and E. S. Slepak. *Avtogennoe Delo* (Welding), v. 21, Apr. 1950, p. 1-6.

An automatic three-phase low-frequency spot welding machine developed especially for welding structural steel parts of thicknesses up to 12 mm. Electrical circuit is diagrammed. Mechanical characteristics of welds obtained in low-carbon, low-alloy structural steels. (K3, CN)

485-K. Automatic Butt Welding of Sheets, One of Which Is Beveled. (In Russian.) M. R. Shraerman. *Avtogennoe Delo* (Welding), v. 21, Apr. 1950, p. 6-10.

Laboratory investigation demon-

strated that superior weld-seam characteristics are obtained for automatic butt welding under flux of steel sheets 14-30 mm. thick when the bevel of the edges to be joined together is unsymmetrical. This technique was found to save 17-40% of the usual time. (K1, ST)

486-K. Alloying Calculations for Deposited Metal in Electric Arc Welding. (In Russian.) P. S. Elistratov. *Avtogennoe Delo* (Welding), v. 21, Apr. 1950, p. 10-12.

A nomogram for simplification of necessary calculations; its application. Influence of certain fundamental factors, such as acidity or basicity of coating, percentage composition of rod or coating, polarity, arc length, etc., on value of the coefficient of exchange is studied. (K1)

487-K. Natural Magnetic Field of the Welding Arc. (In Russian.) I. D. Artanonov. *Avtogennoe Delo* (Welding), v. 21, Apr. 1950, p. 13-15.

Mathematical analysis, showing how to perform practical calculations. How the results may be applied to improvement of welding practice. (K1)

488-K. New Device for Control of Conditions During Contact Welding. (In Russian.) D. S. Balkovets. *Avtogennoe Delo* (Welding), v. 21, Apr. 1950, p. 24-27.

Cathode-ray oscillograph applicable for checking various welding parameters. An ammeter is especially designed for "dynamic" measurement of secondary current. (K1)

489-K. Modern Pipe Welding Practices. Part 1. F. C. Fantz. *Petroleum Engineer,* v. 22, July 1950, p. C7-C10.

Advantages of welded structures, types of pipe connections, and types of flanged joints. (To be continued.) (K general, ST)

490-K. Welding Magnesium. Part 1. Paul Klain. *Industry & Welding,* v. 23, Aug. 1950, p. 22-23, 46.

First of a series on recommended procedures. Weldability, choice of materials, preparation, and surface cleaning. (To be continued.) (K general, Mg)

491-K. Want To Double Your Brazing Operation? *Steel,* v. 127, Aug. 21, 1950, p. 102.

Silver-alloy brazing setup responsible for reducing by one-tnird, cost of producing 500,000 steel roll backs for door locks. By adding a second heating station and another operator, it can be made to double production and cut costs still furtner. (K8, ST)

492-K. How To Weld Corrosion Resistant Materials. W. G. Scherer. *Materials & Methods,* v. 32, Aug. 1950, p. 60-61.

Recommended procedures for Ni and Ni-Clad steels, stainless steels, Ni alloys, and Cu alloys. Welds that are no more susceptible to corrosion than unwelded areas can be made in most corrosion resistant materials. (K general, Ni, Cu, SS, SG-g)

493-K. Welding Patent Classification in the A. F. Davis Welding Library. Robert S. Green. *Engineering Experiment Station, Ohio State University,* Bulletin No. 140, Jan. 1950, 74 pages.

Classification system. Illustrates punch card used. (K general, U8)

494-K. (Book) **Resistance Welding: Designing, Tooling and Applications.** Wallace A. Stanley. 329 pages. 1950. McGraw-Hill Book Co., 330 W. 42nd St., New York 18. $7.50.

Spot welding, projection welding, seam welding, and flash-butt welding. Basic information on resistance welding, the application of basic process details in designing welded parts, and use of this background and design data in tooling and production. (K3)

495-K. The Silver-Brazed Pipe Line. John B. Ross. *Welding Journal,* v. 29, Aug. 1950, p. 636-639.

The process and miscellaneous applications. Both Cu and steel pipes are joined in this way. (K8, Cu, ST)

496-K. Construction and Maintenance of Pipe Lines. R. D. Smith. *Welding Journal,* v. 29, Aug. 1950, p. 639-642.

Historical development of gas for industrial and home use and the important part played by welding. Modern methods, particularly for oxy-acetylene welding. (K2, T4, CN)

497-K. Gas Welding With Bronze in Production. Clinton E. Swift. *Welding Journal,* v. 29, Aug. 1950, p. 646-650.

Production economics and other advantages are said to merit careful consideration of the process for joining steel furniture and other light-gage metal parts. (K2, ST)

498-K. The Resistance Welding of Mild Steel Sheet. W. S. Simmie. *Welding Journal,* v. 29, Aug. 1950, p. 651-654.

Compares British and American methods for the automotive industry. (K3, T21, CN)

499-K. Automatic Inert-Gas-Shielded Arc-Welding Operations. H. O. Jones.

Welding Journal, v. 29, Aug. 1950, p. 655-656.

Some recent developments and applications to production problems. (K1)

500-K. Hydrogen May Be Useful. R. F. Wyer. *Welding Journal,* v. 29, Aug. 1950, p. 659-660.

Uses in atomic-hydrogen arc welding and as a protective atmosphere for preventing oxidation of arc welds during cooling. (K1)

501-K. Tips for Easy Inert-Gas-Shielded Arc Welding. A. U. Welch. *Welding Journal,* v. 29, 1950, p. 664.

Recommendations applicable to aluminum. (K1, Al)

502-K. Alloying Elements in Chromium-Nickel Stainless Steels. Helmut Thielsch. *Welding Journal,* v. 29, Aug. 1950, p. 361s-404s.

Data on stainless steels during the past decade are reviewed and correlated. Effects of the various residual and alloying elements on physical and welding metallurgy of the major grades of stainless. Effects of the various elements on structure and on corrosion resistance, and of thermal treatments. Welding electrode and electrode-coating compositions. 233 ref. (K general, SS)

503-K. Fatigue Strength of Welded Butt Joints. *Welding Journal,* v. 29, Aug. 1950, p. 404s-408s.

Appendix III to Report No. 3 of the Committee on Fatigue Testing (Structural). Investigation of fatigue strength of double-U, groove-welded butt joints with partial joint penetration in ⅞-in. steel plate and of fatigue tests of single-V, groove-welded butt joints, welded from both sides, in ½-in. steel plate. (K9, Q7, CN)

504-K. Indexing Fixtures Applied to Spotwelding. O. Stenson and W. R. Spick. *American Machinist,* v. 94, Aug. 21, 1950, p. 110.

Like a dial-feed device for a punch-press operation, eight fixtures rotate under an automatic spotwelder to turn out small, simple assemblies for telephone relays. (K3)

505-K. A Comparison of Progress in Resistance Welding in Britain and America. W. S. Simmie. *Sheet Metal Industries,* v. 27, Aug. 1950, p. 723-726.

Review applies particularly to the automotive industry. (K3, T21, CN)

506-K. Heavy Plate Fabrication. *Welding,* v. 18, Aug. 1950, p. 326-334.

The fabrication shops of the John Inglis Co., Toronto. Welding methods used for producing various gear casings, pressure vessels and glass-lined tanks. Illustrated. (K general, T26, CN)

507-K. M. V. "Rupertsland"—The Construction of an All-Welded Cargo Vessel. *Welding,* v. 18, Aug. 1950, p. 335-342.

Prefabrication of large units was adopted throughout. Methods of welding the various assemblies. (K general, T22, CN)

508-K. Fountain Pen Production. *Welding,* v. 18, Aug. 1950, p. 343-344.

Projection weld fabrication of stainless steel parts. (K3, SS)

509-K. What Is the Future of Gas Welding? T. J. Palmer. *Welding,* v. 18, Aug. 1950, p. 349-355.

Recent developments in gas welding equipment and technique. Applications and relation to other methods of welding. It is felt that, in its own field, gas welding still has an assured future. Deals with cast iron and mild steel parts. (K2, CI, CN)

510-K. Rectifier Equipment for D.C. Arc Welding. *Engineer,* v. 190, Aug. 4, 1950, p. 129.

Equipment is claimed to combine the simplicity of a.c. welding plant with the advantages of the d.c. arc for certain classes of work. (K1)

511-K. Automatic Arc Welding Under a Double Layer of Flux. (In Russian.) K. K. Khrenov and D. M. Kushnerev. *Avtogennoe Delo* (Welding), v. 21, May 1950, p. 3-6.

This method would permit industrial utilization of simple, inexpensive, not previously fused fluxes and would reduce the amount of preparation and cleaning of the base metal required. An active flux layer is placed over the base metal which enters chemically into the welding process, followed by a passive layer which may consist of granular material and which acts solely to maintain static pressure on the bath of liquid metal. Results obtained using different flux compositions on low-carbon steel. (K1, CN)

512-K. Applicability of Bend Testing of Welded Joints. (In Russian.) A. M. Makara and B. S. Kasatkin. *Avtogennoe Delo* (Welding), v. 21, May 1950, p. 6-13.

Two versions of the same low-carbon steel were tested, one dead melt and the other "bubbling". Influence of relation between strengths of base and of weld metals, of aging time, of heat treatment, and presence of microdefects on quality of the welds was investigated. Comparative data for five types of joints. 11 ref. (K9, CN)

513-K. Experiment on Use of High-Grade Electrodes in the Machine-Construction Industry. (In Russian.) S. K. Zvegintsev and E. A. Sirota. *Avtogennoe Delo* (Welding), v. 21, May 1950, p. 19-21.

Different electrodes for welding of low-alloy steel were investigated. Technological characteristics of different base metal and coating compositions. (K1, T7, AY)

514-K. Weldability of "Bubbling" Steel. (In Russian.) P. N. Berezkin. *Avtogennoe Delo* (Welding), v. 21, May 1950, p. 21-22.

Experimental investigation shows that thin sheets of "bubbling" steel should not be used for welded joints requiring hermetic sealing and operating under dynamic impact loads. (K9, ST)

515-K. Fast Welding Speeds Refrigerator Output. *Steel,* v. 127, Aug. 28, 1950, p. 76.

Several novel welding techniques used at the Frigidaire Div. Electric seam and spot welding are emphasized. (K3, T10)

516-K. Nickel-Molybdenum-Vanadium Alloy Steel Shielded-Arc Welding Electrodes (Low-Hydrogen Type). E. H. Franks, C. T. Gayley, and W. H. Wooding. *Journal of the American Society of Naval Engineers,* v. 62, Aug. 1950, p. 601-619.

Composition and development of these electrodes for welding of armor plate. Operating characteristics, including effects of moisture. Problems encountered during use in the field. Macrographs show weld cracks and weld structures. Procedures found to give satisfactory results.
(K1, T5, CN, AY)

517-K. Quick Test Eliminates Brazing Defects. *Iron Age,* v. 166, Aug. 31, 1950, p.59.

Simple visual test on cupro-nickel specimens which quickly and accurately determines brazability. It is based on the high correlation between surface brightness and brazability. (K8, Cu)

518-K. Gas—Steel—and Glass. Arthur Q. Smith. *Industrial Gas,* v. 29, Aug. 1950, p. 10-12.

Weld fabrication of glass-lined tanks by A. O. Smith Corp.
(K11, T26, CN)

519-K. Producting "Man-Sized" Storage Tanks With Glass-on-Steel Interiors. *Finish,* v. 7, Sept. 1950, p. 29-32.

Equipment and procedures of A. O. Smith Corp. Includes plate forming, welding, blast cleaning, application of vitreous material by spraying, and firing. (K11, T26, CN)

520-K. New Method of Brazing and Soldering. *Automotive Industries,* v. 103, Sept. 1, 1950, p. 51, 58.

Gun method, developed primarily for use in connection with a suitable conveyer system, is said to result in a great increase in speed, a large saving in materials used, and a cleaner and neater job. (K7, K8)

521-K. Design of Arc Welding Fixtures. H. G. Frommer. *American Machinist,* v. 94, Sept. 4, 1950, p. 161, 163.

Brief recommendations are supplemented by illustrations of typical set-ups. (K1)

522-K. Process Speeds Welding. *Steel,* v. 127, Sept. 4, 1950, p. 98.

New Lincoln Electric high-density, hidden-arc method which requires little or no joint preparation. (K1)

523-K. Keeping Them in the Air. W. P. Hoare. *Welding Engineer,* v. 35, Sept. 1950, p. 17-19.

Maintenance welding shop of United Air Lines, South San Francisco. (K general, T24)

524-K. Resistance Welding To Replace Soldering. Russell F. Smith. *Welding Engineer,* v. 35, Sept. 1950, p. 20-22.

Various examples at Delco-Remy Div., General Motors Corp. Enumerates 10 advantages. (K3)

525-K. "Triple Ending" Pipe Line. Margaret Ralston. *Welding Engineer,* v. 35, Sept. 1950, p. 24-25.

Equipment and procedures for joining three 30-ft. lengths of 34-in. gas pipe line. (K1, T4, CN)

526-K. Build a Swimming Bridge for Princeton. Albert Bavaria. *Welding Engineer,* v. 35, Sept. 1950, p. 26-27.

Construction of welded wrought-iron structure used to start swimming races at Princeton University. (K1, T26, CN)

527-K. To Join These Two Castings Took 10,000 Lb. of Thermit. J. M. Wilson. *Welding Engineer.* v. 35, Sept. 1950, p. 31.

50-ton housing of an ingot stripper stand was cast in two halves joined by thermit welding. It took 2800 lb. of thermit to join the crowns, 7200 lb. to make the two footing welds. (K4, CI)

528-K. Are You Up-to-Date on Resistance Welding? W. K. Boice. *Welding Engineer,* v. 35, Sept. 1950, p. 38-41, 56.

Significant advances such as frequency changers, metallic rectifiers, and slope controls. Circuit diagrams. (K3).

529-K. Induction Brazing Reduces Cost. R. E. VanDeventer and G. S.

Bidigare. *Machine Design,* v. 22, Sept. 1950, p. 140, 202.

Use of induction brazing in the planetary cage and output shaft assembly for the Packard Ultramatic transmission. As originally designed, these parts would have been made from two forgings. A slight design change permitted taking advantage of induction silver brazing, making it possible to use two pearlitic malleable castings and a steel shaft. (K8, T21, CI)

530-K. Electronic Welder Speeds Strip Pickling. *Iron Age,* v. 166, Sept. 7, 1950, p. 106.

Flash welder and controls for joining coils of sheet stock in high-speed strip-pickling lines at Westinghouse's East Pittsburgh plant. (K3, L12, CN)

531-K. Castings and Plate Combined for Fabrication Economy. Omer Blodgett. *Iron Age,* v. 166, Sept. 7, 1950, p. 110-111.

How Falk Corp. obtains maximum economy in large weldments by proper use of both steel castings and steel plate welded together in fabrication of heavy machinery. (K1, ST, CI)

532-K. How To Weld Magnesium by the Gas-Welding Processes. Part Two. Paul Klain. *Industry & Welding,* v. 23, Sept. 1950, p. 26-28.

Recommended procedures. (K2, Mg)

533-K. Use of the Inert Gas Shielded Arc Process for Welding Aluminum. Paul Paquin. *Industry & Welding,* v. 23, Sept. 1950, p. 40, 42-43, 82. (K1, Al)

534-K. Clear the Track for Welding. *Industry & Welding,* v. 23, Sept. 1950, p. 44-45, 64.

Use of welding in fabrication of miniature trains for amusement parks. Stainless and carbon steels are used. (K general, CN, SS)

535-K. Unique Method of Construction Speeds Field Erection of 250 Ton Assembly. *Industry & Welding,* v. 23, Sept. 1950, p. 62-63.

Assembly and welding of 150-ft. catalytic cracking tower. (K general, T29, CN)

536-K. Induction Heating Doubles Cylinder Soldering Production. John Nelson. *Steel,* v. 127, Sept. 11, 1950, p. 95-98.

Use of induction heat to silver braze a variety of steel hydraulic cylinders. (K8, ST)

537-K. Copper Furnace Brazing Saves Time—Labor—Material in Formation of Assemblies. Mario R. Glick. *Western Metals,* v. 8, Aug. 1950, p. 22-23.

Application to various carbon and alloy steel parts at Fabriform Metal Products, Inc., Los Angeles. (K8, AY, CN)

538-K. Design for Welded Continuous Steel Framing. J. B. McCormick. *Progressive Architecture,* v. 31, Sept. 1950, p. 94-96.

Unique design developed by a Los Angeles engineer. (K general, T26, CN)

539-K. Cold Welding. *Fortune,* v. 42, Sept. 1950, p. 114-116, 120, 122, 124.

English invention which has been applied to a variety of nonferrous metals. Various finished products made by cold welding. Present status of commercial development of the process in Britain by General Electric, Ltd., and in the U. S. by Koldweld Corp. (K5, EG-a)

540-K. Applications of Unionmelt Welding. C. A. Heffernon. *Canadian Metals,* v. 13, Aug. 1950, p. 32-34, 48.

Procedures and applications. (K1)

541-K. Developments in the Cold Riveting of Aluminium. Ernest Anders and D. G. Elliot. *Engineering,* v. 170, Aug. 11, 1950, p. 141-143. Condensed from *Engineering Journal,* v. 33, June 1950.

Technique developed for use on the aluminum bridge recently built in Canada. Experimental program conducted to determine optimum rivet design, dimensions, and riveting procedure. (K13, T26, Al)

542-K. Steel Fabrication; Saving Material on Press Dies and on Girders. *Iron and Steel,* v. 23, Aug. 1950, p. 356.

"Composite forging" method for making large dies. Toolsteel is flash-butt welded to a mild-steel base. Another steel-saving method consists of a patented castellated-beam construction involving flame cutting and welding. (K3, G22, T5, T26, ST, TS)

543-K. Repair and Reclamation of Grey-Iron Castings by Welding and Allied Methods. A. B. Everest, chairman. *Foundry Trade Journal,* v. 89, Aug. 24, 1950, p. 207-214, 216.

Report of Subcommittee of Technical Council, Institute of British Foundrymen gives detailed, classified recommendations. (K general, L24, CI)

544-K. Structural Welding in the Ottmarsheim Shipyard. (In French.) J. Négre. *Soudure et Techniques Connexes,* v. 4, May-June 1950, p. 107-114; discussion, p. 114-115.

Equipment and procedures of French shipyard. Various types of welding are used. (K general, T22, CN)

545-K. Arc Welding of Light Metals Using Coated Fusible Electrodes. (In French.) Charles Guinard. *Revue de l'Aluminium,* v. 27, June 1950, p. 237-244.

Equipment and procedure. Illustrates weld structures; tabulates weld strengths. (K1, Al)

546-K. Calculation of Weld Strengths on the Basis of True-Stress Diagrams. (In Russian.) *Avtogennoe Delo* (Welding), v. 21, June 1950, p. 4-11.

On the basis of theoretical considerations, a method is developed for calculation of maximum load. Results for a number of simple welds are compared with experimental data, and applicability of the calculation method proved. (K9, Q23)

547-K. Technological Parameters of Automatic Welding Using "Electrorivets". (In Russian.) I. E. Futer. *Avtogennoe Delo* (Welding), v. 21, June 1950, p. 28-29.

Welding with preliminary formation of a hole in the upper one of the pieces to be joined without insertion of the electrode into the hole after excitation of the arc was investigated. Limits of applicability of this method and means of expanding its range. (K1)

548-K. Welding, Brazing and Soldering of Plated Metals. E. V. Beatson. *Metal Finishing,* v. 47, June 1949, p. 93-96.

Previously abstracted from *Journal of the Electrodepositors Technical Society.* See item 22A-50, 1949. (K general)

549-K. All Welded Steel Cab Fabricated With Modern Equipment and Latest Methods. Wilson B. Fiske. *Machine and Tool Blue Book,* v. 46, Oct. 1950, p. 71-74, 76-78.

Special jigs and fixtures, combined with closely adapted and controlled stationary and portable spot welders, result in production efficiency along line of White Motor Co., Cleveland. (K3, T21, CN)

550-K. Electric Welding. *General Electric Review,* v. 53, Sept. 1950, p. 81-83.

Technical and economic significance of developments and trends. R. C. Freeman discusses "Electric-Arc Welding", and W. B. Hills, "Electronic Control of Resistance Welding. (K1, K3)

551-K. Modified Submerged-Arc Process Lowers Welding Costs. *Steel,* v. 127, Sept. 18, 1950, p. 106.

Special equipment designed to minimize oxidation in seam welding major components for heat exchangers. Flux is supplied from a hopper on the cantilever beam for each welder. The hopper includes an outlet tube which disperses flux in the V-shaped groove for each portion of a seam for a distance of several inches ahead of the welding arc. Wire filler materials are fed automatically. (K1, ST)

552-K. 6 Steps to Better Silver Brazing. Roger Metzler. *American Machinist,* v. 94, Sept. 18, 1950, p. 100-102.

Six rules for high-quality results. Mechanical-strength data for the joints are charted vs. thickness. Standard compositions and their melting and flow-points. (K8, Cu, Ni, Fe, Ag, Zn)

553-K. Resistance Welding Applications. R. T. Gillette. *American Machinist,* v. 94, Sept. 18, 1950, p. 135, 137, 139.

Schematic diagrams show details of a variety of simple pieces and components for which resistance welding is suitable. (K3)

554-K. Soft Soldering of Electroplated Aluminium Alloy Components. E. E. Halls. *Electroplating and Metal Finishing,* v. 3, Sept. 1950, p. 493-494.

Compositions of soldering pastes for Al alloys, plated with Cu, Sn, and Ag. Considers use of induction heating. (K7, Al)

555-K. Types of Joints for Welded Piping. *Heating, Piping & Air Conditioning,* v. 22, Sept. 1950, p. 102-105.

The various types of joints used in welded industrial piping systems. (K general)

556-K. Double-Jointing Pipe in the Field. Frank H. Love. *Petroleum Engineer,* v. 22, Sept. 1950, p. D20, D22, D24.

Equipment and procedures for submerged-arc welding of 30-in. pipeline. Special lineup clamp that makes possible welding without use of a stringer bead. (K1, CN)

557-K. Some Basic Problems in Design for Aircraft Welding. J. Koziarski and K. B. Gillmore. *Welding Journal,* v. 29, Sept. 1950, p. 709-714.

Metallurgical, corrosion, production, and stress problems, and a few specific applications. (K general, T24)

558-K. Suggested New Welding Standards. James F. Lincoln. *Welding Journal,* v. 29, Sept. 1950, p. 715-717.

Plea for simplification of welding standards and elimination of unessential testing. (K9, S22)

559-K. Flash Welding Nonferrous Materials. F. L. Brandt. *Welding Journal,* v. 29, Sept. 1950, p. 718-722.

Compares equipment and proced-

ures with those for ferrous materials. Newly developed techniques and welding conditions and results. (K3, EG-a)

560-K. "Heliarc" Welding in Production. T. E. Piper. *Welding Journal,* v. 29, Sept. 1950, p. 723-728.

Developments of inert-gas shielded-arc welding in production applications in an aircraft plant based on economy of equipment, quality, ease of fabrication, uniformity, and lowered costs. (K1, T24)

561-K. Welded Aluminum Ammonium Nitrate Prilling Tower. H. N. Hockensmith. *Welding Journal,* v. 29, Sept. 1950, p. 729-732.

How equipment was fabricated from Al 61-S-T6 to withstand severe service conditions involving strength, fatigue, corrosion, and temperature changes. (K1, T29, Al)

562-K. Welding at the Railroad Reclamation Plant. W. G. Muschler. *Welding Journal,* v. 29, Sept. 1950, p. 733-738.

Various jobs of repair welding, both gas and arc. (K general, T23)

563-K. Development of Production Welding Technique. J. Raymond Wirt. *Welding Journal,* v. 29, Sept. 1950, p. 740-744.

Special resistance welding machines, automatic inspection and timing devices, personnel considerations, and careful attention to specific applications at Delco-Remy Div., General Motors Corp. (K3)

564-K. Electric Utility Welding in the Shop and Field. David P. O'Connor. *Welding Journal,* v. 29, Sept. 1950, p. 745-751.

A variety of welding processes are utilized in maintenance and overhaul operations of an electric-power system. (K general, T1)

565-K. Crack Sensitivity of Aircraft Steels. A. W. Steinberger, B. J. DeSimone and J. Stoop. *Welding Journal,* v. 29, Sept. 1950, p. 752-764.

Investigation of the relative cold-crack sensitivity of several kinds of weld-filler metal used in aircraft construction. The principal materials studied were modified SAE 4320, 4330, and 6130. Tests were also conducted with SAE 4130, NE 8630 and Types 310, 347, and 410 stainless steel filler materials. (K9, T5, T24, AY, SS)

566-K. Spiral Tubing Produced by "Heliarc" Welding. *Welding Journal,* v. 29, Sept. 1950, p. 769.

Coiled strip is stretched into a spiral having adjacent sections in contact. Coiled strip of proper width is placed on the forming machine and forced through a die that makes the spiral. As the tube emerges from the die it passes under the Heliarc torch and the seam is automatically welded. The tube can then be given a cold draw to produce a perfectly smooth surface. Applicable to ferrous and nonferrous metals. (K1)

567-K. Helium Vs. Argon for Welding of Aluminum. A. J. Last *Welding Journal,* v. 29, Sept. 1950, p. 770-771.

Tests indicate that the helium welds are stronger than the argon welds. Argon is still used for manual welding because of greater ease of arc manipulation. (K1, Al)

568-K. Disappearing Welds. M. L. Powers. *Welding Journal,* v. 29, Sept. 1950. p. 772.

Special truck bodies are oxy-acetyline welded and finished with solder so that the welds are completely invisible. (K2, K7, T21, CN)

569-K. Effects of Reduced Atmospheric Pressure on Arc-Welding Characteristics. M. L. Begeman, B. H Amstread, and U. I. Mashruwala. *Welding Journal,* v. 29, Sept. 1950, p. 433s-440s.

Pressures down to 5 in. Hg absolute were investigated. Mild steel plates were welded in an enclosed chamber with a semi-automatic welding head. Beads were first deposited under conditions which were optimum for the electrode under atmospheric pressure. Then, optimum conditions were determined for the various pressures by running beads at different currents and arc lengths. Significant changes in arc characteristics and weld properties were observed. Equipment and procedure. Macrographs show effects of current and arc-length variation on bead shape. (K1, CN)

570-K. The Projection Welding of 0.010 and 0.020-In. Steel Sheet. E. F. Nippes, J. M. Gerken, and J. G. Maciora. *Welding Journal,* v. 29, Sept. 1950, p. 441s-449s.

Effects of projection size and shape, welding current, electrode force, electrode-tip material and sheet surface resistance were studied. Macrographs show weld sections. Recommended conditions for AISI 1010, 1015, and 1020 steels in 0.040, 0.062, and 0.125 in. thicknesses, as well as for AISI 1010 in 0.010 and 0.020-in. thicknesses. (K3, CN)

571-K. Effect of Low-Temperature Cooling Rate on the Ductility of Arc Welds in Mild Steel. A. E. Flanigan, S. I. Bocarsky, and G. B. McGuire. *Welding Journal,* v. 29, Sept. 1950, p. 459s-466s.

The ductility of E 6010 welds is shown to depend on the cooling rate of the weld below 400° F., rap-

id cooling promoting low ductility. This behavior, to which low-hydrogen welds appear immune, has important practical implications. (K9, Q23, CN)

572-K. A Survey of Modern Theory on Welding and Weldability. D. Séférian. *Sheet Metal Industries,* v. 27, Aug. 1950, p. 727-730, 732.

Technical and structural weldability tests. Weldability of aluminum and light alloys. (To be continued.) (K9, Al)

573-K. Soldering of Aluminium; Avoidance of Brittlement. *Metallurgia,* v. 42, Aug. 1950, p. 131-133.

Experimental work shows that some Al alloys may be subject to brittleness and cracking as a result of penetration by solder during tinning. Method of soldering involving pretreatment by abrasion or by phosphoric-nitric acid treatment followed by tinning with Sn-Zn solder and finishing with Sn-Pb lead. (K7, Al)

574-K. (Book) **Recommended Practices for Salvaging Automotive Gray Iron Castings by Welding.** American Welding Society, 33 W. 39th St., New York 18, N. Y. 19 pages. 50 cents.

A tentative standard. Methods used for automotive repairs can serve as a guide for repairing other types of castings. Oxy-acetylene and shielded-arc welding with and without preheat and stress relief, braze welding, brazing, soft soldering, metallizing, and use of mechanical methods. Typical defects and their repair. (K general, L24, T21, CI)

575-K. (Book) **Recommended Practices for Resistance Welding.** Rev. ed. 60 pages. American Welding Society, 33 W. 39th St., New York 18, N. Y. $1.00.

Welding schedules for spot and seam welding mild and medium carbon steels, low-alloy steels, stainless steels, Ni, monel, Inconel, and Mg alloys. Recommended practices for projection welding of low-carbon and stainless steels Flash welding data for low and medium strength forging steels. Methods of testing resistance welds. (K3)

576-K. (Book) **Welding, Brazing, and Soldering.** 95 pages. 1949. Popular Mechanics Co., Chicago. $1.25.

Twenty articles reprinted from *Popular Mechanics.* Stainless steel and aluminum are among the materials discussed. Emphasis is placed on methods of using available types of equipment to keep costs down. (K general)

577-K. Bulbous Bumper Guards Change Joining Procedure. A. H. Allen. *Steel,* v. 127, Sept. 25, 1950, p. 74-75.

How welding studs to auto bumper guards for further attachment to bumper rails of Kaiser cars gets around problem of cost and corrosion. (K1, T21, CN)

578-K. Superalloy Bolting Assemblies at 1250 and 1400° F. C. T. Evans, Jr., and E. J. Vater. *Metal Progress,* v. 58, Sept. 1950, p. 348-351.

Gas turbines, steam turbines, and other devices operated at high temperatures usually are assembled with one or more flanged and bolted joints. It is necessary to be able to retighten and reassemble bolts and studs repeatedly without galling or fracture of the metal. Effects of repeated tightening, heating and cooling, and disassembly on assemblies of 19-9DL, Discalloy 24, Inconel X, S590, and Refractaloy 26, using silver and copper anti-galling pastes (compositions given). (K13, SG-h, SS, Ni)

579-K. Russian Research in Arc Welding. L. W. Smith. *Metal Progress,* v. 58, Sept. 1950, p. 355.

Discusses abstract of Russian paper by K. V. Zvegintseva (June issue; item 358-K). Points out that the process described was developed by Cornell Aeronautical Laboratory. Includes abstractor's comments. (K1, ST)

580-K. Faster Brazing and Soldering on Production Jobs. *Sheet Metal Worker,* v. 41, Sept. 1950, p. 56, 58.

Gun method. (K8)

581-K. Resistance Welding—An Expanding Field. C. B. Stadum. *Westinghouse Engineer,* v. 10, July 1950, p. 178-182.

Fundamental principles and development of modern equipment. (K3)

582-K. Electric-Arc Welding of Cast Iron. A. M. Hill, F. W. Zilm, and C. E. Spencer. *Oil and Gas Journal,* v. 49, Sept. 21, 1950, p. 232, 234, 237, 239.

Repair technique. How maintenance can be simplified and costs reduced by good welding practice. (K1, CI)

583-K. How Northern Natural Achieves High-Quality Welds. L. J. Cunningham. *Oil and Gas Journal,* v. 49, Sept. 21, 1950, p. 343, 345.

Procedures of Northern Natural Gas Co., Omaha, Neb., in pipe-line welding. (K general, T29, CN)

584-K. Braze Welding Cuts Costs in Fabrication of Many Products. C. E. Swift. *Materials & Methods,* v. 32, Sept. 1950, p. 56-58.

How steel sheet-metal parts and light-wall tube assemblies are read-

ily joined by use of the oxy-acetylene torch and bronze welding rods. (K8, ST)

585-K. Temporary Welding Setup Solves Small Lot Problems. Nelson Martin. *Steel,* v. 127, Oct. 2, 1950, p. 94.

Setup designed for arc welding 76 Cr steel superheater tubes, without excessive equipment costs. (K1, AY)

586-K. Stainless Beer Barrel. Jack I. Medoff. *Welding Engineer,* v. 35, Oct. 1950, p. 47-49.

Use of inert-arc welding in fabrication. Each barrel is made from seven formed pieces of stainless steel. (K1, T29, SS)

587-K. Low Heat Avoids Stresses. *Welding Engineer,* v. 35, Oct. 1950, p. 53.

Weld repair of 100,000-psi. testing machine. After gas welding was unsuccessful, arc welding with low-temperature electrodes gave satisfactory results. (K1, T5, ST)

588-K. Ten Years' Progress in Welding in the U. S. A. A. B. Kinzel, D. Swan, and H. Biers. *Sheet Metal Industries,* v. 27, Sept. 1950, p. 829-833.

Invitation paper presented at the Deutscher Verband für Schweisstechnik, Duisburg; and at the Internationale Metallurgische Schweisstagung in Leoben, both June 1950. (K general)

589-K. The Argonarc Welding of Stainless Steel Sheet. J. F. Lancaster. *Transactions of the Institute of Welding,* v. 13, Aug. 1950, p. 111-121.

Advantages of process, and details of experimental work on two problems: Weld profile or undercutting and arc wander. Solution of the first problem consisted of use of a flux containing a silicone compound. The second was solved by use of tungsten + 0.5% ThO_2 or alkaline-earth-coated tungsten for welding rods. Production tests then followed in which equipment design, dilution of argon with other gases, and automatic welding were studied. (K1, SS)

590-K. Discussion on "The Control of Distortion". *Transactions of the Institute of Welding,* v. 13, Aug. 1950, p. 128-130.

Deals with paper by R. G. Braithwaite (Apr. 1950 issue; see item 351-K). Diagrams show methods used for control during welding of tanks, boxes, girders, etc. (K1, T26, CN)

591-K. The Welding of Thick Aluminium Alloy Plates by the Argon Arc Process. J. E. Chard and N. Macdonald. *Welding Research,* v. 4, Aug. 1950 (bound with *Transactions of the Institute of Welding,* v. 13), p. 71r-78r.

Development of argon-arc equipment designed for operation with currents up to 600 amp.; also electrically controlled equipment for automatic welding of longitudinal and circumferential seams. Welding technique for A.W.10 alloy was developed to produce welds in plate up to ⅝ in. thick which, after heat treatment, give tensile properties equal to those of the parent plate, except for a reduced percentage elongation. Problems involved in production of a pressure-tight seam. (K1, Al)

592-K. Some Extracted Notes on Hastelloy Fabrication and Welding. *Welding Research,* v. 4, Aug. 1950 (bound with *Transactions of the Institute of Welding,* v. 13), p. 79r-80r.

Welding features and recommended procedures for four Hastelloys. (K general, Ni)

593-K. The Effect of Silicon on the Tendency of Aluminum Alloys Toward Weld Cracking. (In German.) Hans Mäder. *Zeitschrift für Metallkunde,* v. 41, May 1950, p. 140-144.

Hydrogen is the suspected cause of weld cracking. However, chlorinated as well as unchlorinated alloys show an equal tendency to weld cracking. The desirable effect of Si is explained by the structure of the alloys. Examples show the impossibility of eliminating weld cracking by use of certain welding rods. (K9, Al)

594-K. Applicability of New Automatic Electric Welding Processes. (In German.) M. Komers and H. Krug. *Schweissen und Schneiden,* v. 2, June 1950, p. 118-124.

Various automatic and semi-automatic electric welding methods, equipment, and electrodes. (K1)

595-K. The Autogenous Process. (In German.) H. Schulz. *Schweissen und Schneiden,* v. 2, June 1950, p. 125-133.

Development and varied uses. Includes welding, cutting, deposition of hard metal, surface hardening, metal spraying, and rust removal. 29 ref. (K general, G22, J2, L24, L23)

596-K. Electric Welding of 100-Mm. Thick, High-Carbon, Unalloyed Steel. (In German.) A. Buchholz. *Schweissen und Schneiden,* v. 2, June 1950, p. 133-136.

Preliminary tests made with basic lime-coated electrodes and with austenitic Cr-Ni steel electrodes. The basic lime-coated electrodes are recommended because higher tensile strength welds were obtained than with the Cr-Ni electrodes and because they cost only about one-quarter as much. (K1, CN)

597-K. The Extended Right-Hand Welding Method. (In German and French.) C. G. Keel. *Zeitschrift für Schweisstechnik; Journal de la Soudure,* v. 40, Jan. 1950, p. 2-8; Feb. 1950, p. 28-34; Mar. 1950, p. 56-59; Apr. 1950, p. 70-72; June 1950, p. 106-108.

Reports on experiments made to develop an improved acetylene welding method for steel and improved welding rods. The welding procedure. 1 ref. (K2, ST)

598-K. Advances in the Technique of Welding in the Years 1948-1949. (In German.) Wilhelm Lohmann. *Stahl und Eisen,* v. 70, May 25, 1950, p. 465-471; June 8, 1950, p. 515-518.

A comprehensive review of worldwide literature. 74 ref. (K general)

599-K. Behavior of Unalloyed Low-Carbon Strip Steel in Resistance Welding, and Its Testing. (In German.) Walter Eilender and Karl Holzhausen. *Stahl und Eisen,* v. 70, Aug. 3, 1950, p. 698-702.

Butt welds (tube seams) were made with strip steels containing 0.02-0.42% C. In the range 1148-1338° C., an exothermal reaction was observed. Free cementite reduces, pearlite increases, the weldability of steel, which explains the different weldabilities of different samples from the same batch of steel. (K3, K9, CN)

600-K. Effect of Structure on the Resistance Welding Behavior of Low-Carbon Steel. (In German.) Walter Eilender and Robert Mintrop. *Stahl und Eisen,* v. 70, Aug. 3, 1950, p. 702-707.

The weldabilities of steels with 0.11% C (pearlitic structure) and 0.08% C (granular cementite structure) were investigated. The former had better welding properties than the latter. Photomicrographs show structures of the base, intermediate, and welding zones of the two steels. (K3, K9, CN)

601-K. Investigation of Automatic Welding Using a Three-Phase Arc. (In Russian.) G. P. Mikhailov, B. S. Bril, and E. I. Bobrov. *Avtogennoe Delo* (Welding), v. 21, July 1950, p. 9-12.

New, specially designed, three-phase, automatic welding head and its characteristics. Comparative data on the productivity of three-phase vs. single-phase welding of low-carbon steel and the influence of welding current and welding speed on fusion coefficient, depth of penetration, and area of penetration. (K1, CN)

602-K. Argon-Arc Welding of Copper. (In Russian.) Ts. S. Braude. *Avtogennoe Delo* (Welding), v. 21, July 1950, p. 12-15.

Including problems of welding technique, thermal gradients, securing the desired weld-metal quality, and influence of base metal containing different amounts of oxygen. Welding was performed with direct current of direct polarity on copper sheet 1-3 mm. thick. Results of mechanical tests of welded plates and of metallographic investigation. The possibility of obtaining a strong weld without the additional operations of peening and heat treatment. (K1, Cu)

603-K. Gas Pressure Welding of Small-Diameter Tubes. (In Russian.) A. S. Fal'kevich and R. B. Polyakova. *Avtogennoe Delo* (Welding), v. 21, July 1950, p. 16-18.

Technique was investigated for tubes of 33.5-88.5 mm. diam., using multiflame oxy-acetylene torches. Composition of tubes and welding conditions, as well as results of mechanical tests of welded tubes. Applicability of this method for welding plain-carbon steel. (K2, CN)

604-K. Welding of Thick-Walled Containers. (In Russian.) I. N. Gerasimenko. *Avtogennoe Delo* (Welding), v. 21, July 1950, p. 24-25.

Procedures for manual arc and automatic arc welding of large boilers and high-pressure tanks made of low-alloy steels of the pearlite type and high-alloy steels of the austenite type. (K1, AY, SS)

605-K. Resistance Welding; Some Modern Applications and Developments. R. Bushell. *Welding,* v. 18, Sept. 1950, p. 372-381.

Most of the examples given have been introduced during the past two to three years and have improved production methods with corresponding cost reduction. Applicable to mild and stainless steel and to aluminum. Equipment and applications. (K3, CN, SS, Al)

606-K. Welded Power Plant; A Visit to W. H. Allen, Sons & Co., Ltd. *Welding,* v. 18, Sept. 1950, p. 391-398.

Use of welding in marine and stationary power plant. (K general, T25, CN)

607-K. Piping Defects and the Welder. W. G. Lawson. *Welding,* v. 18, Sept. 1950, p. 406.

Practical recommendations for avoidance of the defect known as "piping" or cavities, by modification of welding technique. (K9)

608-K. Stainless Can Be Brazed for 2000° F. Service. Robert L. Peaslee and Willard M. Boam. *Iron Age,* v. 166, Sept. 28, 1950, p. 74-77; Oct. 5, 1950, p. 84-87.

Development of a satisfactory procedure involving use of a dry H_2 atmosphere, special application methods, and a new brazing alloy. The alloy has the trade name Colmonoy No. 6. Mechanical properties of the joints. Exhaustive tests which show that the joints made by the procedure, using S-590 as base metal, have suitable physical properties for 2000° F. service. Tensile strength, yield strength, and proportional limit are generally as high as those of the base metal at high temperatures. Oxidation resistance is excellent. (K8, SS)

609-K. A New Method of Brazing and Soldering. *Finish,* v. 7, Oct. 1950, p. 11, 49.

"Practically automatic" method that brazes seams at rate of 60-120 in. per min. (K8, K7)

610-K. Resistance Welding Plus Effective Quality Control Helps Ford Produce 5800 Units Per 8 Hour Day. *Industry & Welding,* v. 23, Oct. 1950, p. 24-26.

Production of automotive gas tanks. (K3, CN)

611-K. Stud Welding for Lower Costs—Improved Designs. *Industry & Welding,* v. 23, Oct. 1950, p. 34-36, 73.

Miscellaneous applications and procedures. (K1)

612-K. Use Semi-Automatics for 500% Production Increase. R. L. Looney. *Industry & Welding,* v. 23, Oct. 1950, p. 44.

Combination of semi-automatic welding equipment and a specially designed travel carriage makes it possible for Robberson Steel Co. of Oklahoma City to weld bridge railing more than five times faster than previous regular hand welding methods. (K general, CN)

613-K. 100% Efficient Cable Connections. *Industry & Welding,* v. 23, Oct. 1950, p. 48-50, 65.

Report on a new method for splicing welding cable and joining it to lugs, connectors, etc. Known as the "Cadweld" process, it involves exothermic reaction of powdered copper oxide and aluminum in a graphite crucible which surrounds the copper cable joint. (K6, Cu)

614-K. Pick the Right Welding Method. *Linde Tips and Oxy-Acetylene Tips,* v. 29, Oct. 1950, p. 77-80.

Hints for welding gray cast iron, low and high-carbon steel, wrought iron, lead, and white metal, and for braze-welding, in tabular form. (K general)

615-K. Backhand Welding of Pipe. *Linde Tips and Oxy-Acetylene Tips,* v. 29, Oct. 1950, p. 82-83.

Recommended technique. (K2)

616-K. Hints on How To Weld Sheet Lead. *Linde Tips and Oxy-Acetylene Tips,* v. 29, Oct. 1950, p. 88-89. (K2, Pb)

617-K. Brazed and Soldered Joints for Piping. *Heating, Piping & Air Conditioning,* v. 22, Oct. 1950, p. 75-77.

Practical information on brazed joints, soft-soldered joints, lead-welded joints, and joints between dissimilar metals for pipe and tubing. (K7, K8)

618-K. Modern Pipe Welding Practices. Part 3. Nozzle Reinforcement. F. C. Fantz. *Petroleum Engineer,* v. 22, Oct. 1950, p. C38-C42.

With emphasis on steel, but including a short section on aluminum. (K2, ST, Al)

619-K. Making Packard's Newest Bodies at the Briggs Plant. Joseph Geschelin. *Automotive Industries,* v. 103, Oct. 1, 1950, p. 46-48.

Welding equipment and procedures. "Poke gun" spot welding for relatively inaccessible locations. (K3, CN)

620-K. Wider Steel Sheets by Welding. *Automotive Industries,* v. 103, Oct. 1, 1950, p. 53.

Automobile manufacturers are using a variety of welding methods to produce extra-wide sheet for body stampings, since the wide stock is in short supply and sells for a higher price. (K general, CN)

621-K. 16 Steps for Welding Piston-Ring Carriers. Harold E. Bailie. *American Machinist,* v. 94, Oct. 2, 1950, p. 88-89.

Procedures, developed jointly by Nordberg Mfg. Co. and Alcoa, for making welded Al-alloy pistons. The steps begin with wirebrushing, solvent cleaning, and controlled preheating, followed by an automatic sequence of arc-welding procedures. (K1, L10, L12, Al)

622-K. Zinc-Base Solder. *Metal Progress,* v. 58, Oct. 1950, p. 546, 548. Translated and condensed from "Soldering With Zinc Solder", F. Trey, *Berg- und Hüttenmännische Monatshefte,* v. 92, Dec. 1947, p. 221-228.

Shear strength data for joints made with 25% Sn, 40% Sn, and 98% Zn solders in Cu-clad Al sheets. Results are quite satisfactory. (K7, Al)

623-K. For Inert Gas Shielded Welding—Argon or Helium? John Berryman. *Iron Age,* v. 166, Oct. 12, 1950, p. 155-157.

Helium offers higher heat, deeper penetration, and faster speeds. Ar-

gon requires lower heat, produces less spatter, and gives smoother operation. In special cases, the gases can be mixed for optimum arc characteristics; these mixtures may run from 6:1 to 1:1. (K1)

624-K. Welding Notebook. *Iron Age,* v. 166, Oct. 12, 1950, p. 170-171, 206, 208, 210, 212.

Practical welding ideas for the production and welding engineer, illustrated by actual case studies. Includes hard-facing and surface preparation. (K general, L22)

625-K. Magnesium-Welding Fixtures for the "Flying Wing". Gilbert C. Close. *Machinery* (American), v. 57, Oct. 1950, p. 186-191.

Special procedures and fixtures developed for use in welding of Northrop airplane. General requirements for design of welding fixtures for Mg. (K1, T24, Mg)

626-K. Different Metal Thicknesses Welded in One Handling. C. B. Stadum. *Steel,* v. 127, Oct. 16, 1950, p. 100-101.

How time, manpower, floor space, equipment, and installation costs are saved by a new integrated control system for resistance welding applications involving two to five metal thicknesses. (K3)

627-K. Field Application of Alloy Strip Liners Inside Refinery Vessels by Welding. *Petroleum Processing,* v. 5, Oct. 1950, p. 1085-1086.

Principal lining materials used are Types 405 and 410 stainless steels, $\frac{3}{64}$ in. thick, with electrodes of 25-20 Cr-Ni alloy. Good results are obtained with 2-bead welding on a vertical strip installation. Considerable attention is given to surface preparation. (K1, T28, SS)

628-K. A Survey of Aluminum Welding Techniques. Floyd A. Lewis. *Tool Engineer,* v. 25, Oct. 1950, p. 21-23.

(K general, Al)

629-K. Bonding Investigation of Titanium Carbide With Various Elements. Walter J. Engel. *National Advisory Committee for Aeronautics,* Technical Note 2187, Sept. 1950, 15 pages.

The elements were individually fused on cupped, solid, high-density TiC at minimum fusion temperatures in a helium atmosphere and at atmospheric pressure. Criterion of metallographic evaluation was the presence or extent of a mechanical interlocking structure or the formation of a new phase, not considering the strength of the element. Only Ni, Co, Cr, and Si bonded with TiC. (K5, M27, Ti, C-n)

630-K. Repair and Reclamation of Castings. *Foundry Trade Journal,* v. 89, Sept. 28, 1950, p. 297-304.

Joint discussion of two technical subcommittee reports: "Repair and Reclamation of Grey-Iron Castings by Welding and Allied Methods", and "Repair and Reclamation of Non-Ferrous Castings" (Aug. 24 and Sept. 14 issues, respectively). (K general, L24, E, CI)

631-K. Welding and Soldering of Copper and Its Alloys. (In French and German.) C. G. Keel. *Pro-Metal,* v. 3, Aug. 1950, p. 661-675.

Weldable copper alloys, methods of welding and soldering, fluxes, mechanical properties of welded and soldered joints, surface treatment of welded and soldered joints, and apparatus for gas welding and soldering. (K2, K7, Cu)

632-K. Electrical Resistance Welding of Copper and Copper Alloys. (In French and German.) H. Schwing. *Pro-Metal,* v. 3, Aug. 1950, p. 679-685.

Discussion illustrated by photographs of equipment. (K3, Cu)

633-K. Autogenous Welding With Small Torches of Sheets up to 24 Mm. in Thickness; the Importance of Double-Bead Welding Among Manual Welding Methods. (In German.) Hans Melhardt. *Schweisstechnik,* v. 4, June 1950, p. 61-71.

Backhand and forehand welding methods; the vertical one-sided and two-sided double-bead welding methods. Shows that double-bead welding method is highly desirable from the standpoint of material, time, energy, and costs. 10 ref. (K2, CN)

634-K. (Book) Welding Design and Processes. R. Richard Hilton. 342 pages. 1950. Chapman & Hall, Ltd., 37 Essex St., London, W.C. 2, England. 36s net.

Reference book covering welding design as well as a fairly complete summary of welding and allied processes. A section on heat treatment is included. A short appendix gives useful formulas and tables. (K general)

635-K. Templets Locate End-Welded Studs. H. W. Bartley. *American Machinist,* v. 94, Oct. 16, 1950, p. 142-144.

Procedure. (K1)

636-K. Induction Heat Cuts Soldering Cost in Half. Charles H. Yetman. *Iron Age,* v. 166, Oct. 19, 1950, p. 81-83.

How replacing a hand gas torch with induction heating for soldering brass name-plate mounting studs

eliminated warpage, cut solder cost, and increased production rate. (K7, Cu)

637-K. Rehabilitation of Ore Cars. J. F. Likarish. *Welding Journal,* v. 29, Oct. 1950, p. 837-843.

Rebuilding of 400 of the older cars by welded construction. (K1, T23, CN)

638-K. A Practical Method for Obtaining Consistent Resistance Welds. J. W. Kehoe. *Welding Journal,* v. 29, Oct. 1950, p. 844-855.

Plan for applying a recommended spot welding schedule in production through simple correlation of the characteristics of a specific spot welding machine with the schedule. (K3)

639-K. Better Welding at Lower Cost. Lew Gilbert. *Welding Journal,* v. 29. Oct. 1950, p. 855-862.

A general discussion of factors which determine quality and cost of welding. Hints for securing improved quality at lower cost. (K general)

640-K. Variables in Cross-Wire Welding of Dissimilar Metals. I. S. Goodman. *Welding Journal,* v. 29, Oct. 1950, p. 863-875.

Because of the current expansion of radar, television, therapeutic, and industrial lighting and similar electrical and electronic industries, the quality of cross-wire welds incorporated into filament structures becomes more important. Variables in cross-wire resistance welding of Ni, Fe, Mo, and W wires to each other in various sizes from the viewpoints of equipment supplier, equipment user, and product manufactured. Among these are strength, conductivity, rotation, intergranular corrosion, walk-out, noise, vapor pressure, and ease of welding. Equipment variables include timers, electrode materials, welder heads, and transformers. (K3, T1, Ni Fe, Mo, W)

641-K. Welding High-Pressure, High-Temperature Piping. H. J. Irrgang. *Welding Journal,* v. 29, Oct. 1950, p. 876-879.

Some practical hints for meeting the exacting specification requirements of the materials involved. (K general, ST)

642-K. Welding Aluminum With Inert Arc D. C. John W. Mortimer. *Welding Journal,* v. 29, Oct. 1950, p. 879-881.

Advantages of the inert-gas-shielded arc using direct current and helium gas. Includes weld macrographs. (K1, Al)

643-K. Fabrication of Main-Line Road and Switcher Locomotives. F. T. Perry. *Welding Journal,* v. 29, Oct. 1950, p. 882-886.

Procedures and sequence of operations, mainly arc welding and spot welding. (K1, K3, T23, CN)

644-K. Jigs and Fixtures for Inert-Gas Arc Welding. H. A. Huff, Jr. and A. N. Kugler. *Welding Journal,* v. 29, Oct. 1950, p. 893-903.

Need for jigs and fixtures and the necessity to design these fixtures for the newer welding processes involved as well as for the product to be made. (K1, CN)

645-K. Mechanizing Brazing Operations. *Welding Journal,* v. 29, Oct. 1950, p. 903.

Use of silver alloy brazing for assembly of stamped steel lock parts. (K8, CN)

646-K. Hints for White Metal Welding. E. V. Olson. *Welding Journal,* v. 29, Oct. 1950, p. 904-907.

Gas welding procedures on automotive die castings. (K2, Sn, Sb, Pb)

647-K. A New Method of Brazing and Soldering. Charles Boyden, Sr. *Welding Journal,* v. 29, Oct. 1950, p. 907-909.

"Gun" method usually used in connection with a conveyer for moving the work past the gun. Sometimes, however, the gun moves and the work is stationary; or both gun and work may move together. (K8, K7)

648-K. Welding Vs. the Future Bridge Engineer. Alois Cibulka. *Welding Journal,* v. 29, Oct. 1950, p. 909-910.

Design and construction of welded bridges. The various types and their comparative properties. (K general, T26)

649-K. Optimum Flash-Welding Conditions for Aluminum Alloys—the Importance of Upset Variables. E. F. Nippes, W. F. Savage, J. J. McCarthy, and P. Patriarca. *Welding Journal,* v. 29, Oct. 1950, p. 497s-511s.

Results of investigation indicated that nearly 100% tensile-joint efficiency could be attained by flash welding the alloys 61S-T, 14S-T, 75S-T, and 24S-T. A comprehensive study of the peak temperature reached by the metal near the final weld line and the temperature distribution around it proved helpful in evaluating optimum welding conditions. Upset-pressure requirements for producing various amounts of upset per specimen up to 1.5 times the section thickness; influence of welding variables on these requirements. Magnitude of upset current was found to be the most important variable influencing upset pressure requirements. (K3, Al)

650-K. The Spreading Resistance of Contacts. W. B. Kouwenhoven and W. T. Sackett, Jr. *Welding Journal,* v. 29, Oct. 1950, p. 512s-520s.

Study of electrical resistance of contacts resulting from constricting effect of the contact subareas which produces nonuniform current flows in the contact material. Application of the information to resistance welding. (K3)

651-K. Energy Distribution in Electric Welding. *Welding Journal,* v. 29, Oct. 1950, p. 520s-521s.

Discussion by Merrill Skolnik of above paper by C. E. Jackson and A. E. Shrubsall (May issue, item 306-K). Includes authors' reply. (K1)

652-K. New Procedures for Studying Electrode Coverings. Jay Bland and Solomon Goldspiel. *Welding Journal,* v. 29, Oct. 1950, p. 522s-529s.

New procedures for following variations in moisture contents with time; and for identification and analysis of electrode coatings by X-ray spectrometer and optical spectrographic methods. (K1, T5)

653-K. Notch Sensitivity of Welded Steel Plate. *Welding Journal,* v. 29, Oct. 1950, p. 529s-530s.

Discussion by F. J. Windsor of paper by L. J. McGeady and R. D. Stout (May issue, item 308-K). Includes authors' reply. (K9, CN)

654-K. Electrode Tip Life in Spot Welding Galvanized Steel. Frank W. McBee, Jr. *Welding Journal,* v. 29, Oct. 1950, p. 531s-535s.

Effect of a long series of spot welds upon the electrode tip and weld characteristics. (K3, CN, Zn)

655-K. New Techniques Added to Pressure Welding. *Iron Age,* v. 166, Oct. 26, 1950, p. 58-60.

New types of cold welds developed by Koldweld Corp. which overcome objections to old methods. Dissimilar metals can now be more conveniently welded, and cold welding methods of joining very thin sheets have been improved. Applications described are to Al and Cu. (K5, Al, Cu)

656-K. 242-Gun Welder Speeds Auto Assembly. *Steel,* v. 127, Oct. 30, 1950, p. 58.

Equipment used in manufacture of "Henry J." (K3, T21)

657-K. Mash Resistance Welding Produces Flat Seams in Steel. O. Broner. *Materials & Methods,* v. 32, Oct. 1950, p. 77-78.

Technique and applications. (K3, CN)

658-K. Stud Welding Speeds Steel Production. Robert C. Singleton. *Iron and Steel Engineer,* v. 27, Oct. 1950, p. 100-104.

Use in steel-plant maintenance work of openhearth doors, wet skid tubes, openhearth burners, and crane rails. (K1, D2, ST)

659-K. Versatility and Low Cost Through Arc Welding. *Sheet Metal Worker,* v. 42, Oct. 1950, p. 60-61.

Use of arc welded jigs and fixtures in the fabrication of 18 and 20-gage metals into electrostatic cleaning equipment, at Trion, Inc. (K1)

660-K. Rapid Testing of Weld Strengths. *Chemical Age,* v. 63, Sept. 30, 1950, p. 467-468.

Servo-controlled pulsation-pressure equipment for testing welds in pressure vessels, which is in use in the new laboratory of British Welding Research Association. (K9)

661-K. Ultrasonic Soldering of Aluminium. B. E. Noltingk and E. A. Neppiras. *Nature,* v. 166, Oct. 7, 1950, p. 615.

For some years it has been known that it is possible to tin aluminum and its alloys by subjecting their surface to the action of ultrasonic vibration at the same time as molten solder is applied. It has now been established that the process is one of removing the oxide skin by cavitation erosion. (K7, Al)

662-K. Architectural Metalwork. Colin Spencer. *Welding,* v. 18, Oct. 1950, p. 418-425.

Required welding techniques. Widely varying examples of this type of craftsmanship as practiced in Britain. (K general, T26, CN)

663-K. The Automatic Flash Welding Machine. A. G. Galle and C. A. Burton. *Welding,* v. 18, Oct. 1950, p. 437-441.

Principles of operation together with the latest design developments. Tables are provided for determining correct machine settings. (K3)

664-K. Stud Welding With "Stored Energy". Development of the Graham Process. K. S. Estlin. *Welding,* v. 18, Oct. 1950, p. 446-448.

Equipment and procedures. (K1)

665-K. Welded Power Plant; A Visit to W. H. Allen, Sons & Co., Ltd. (Concluded.) *Welding,* v. 18, Oct. 1950, p. 449-453.

Summary of a lecture on mild steel arc weld testing procedures of above company, given by R. T. Rolfe. (K1, CN)

666-K. Manufacturing Chains by Means of Electric Resistance Welding. (In German.) W. Pungel. *Schweissen*

und Schneiden, v. 2, Aug. 1950, p. 216-220.

Methods used by different firms. Advantages over forged chains. (K3, T7, CN)

667-K. Hints for Welding Common Metals. *American Machinist,* v. 94, Oct. 30, 1950, p. 127, 129.

A tabular presentation applying to oxy-acetylene welding. (K2)

668-K. Oil Power Boosts Welding Production 300 Percent. Willard C. Gunzelman and Charles H. Hallett. *Applied Hydraulics,* v. 3, Nov. 1950, p. 17-19.

Special hydraulically operated welding equipment for production of steel combine rasp bars (agricultural equipment). (K general, T3)

669-K. Further Developments in the Koldweld Process. *Light Metal Age,* v. 8, Oct. 1950, p. 16-19.

Recent applications to Al and Cu. (K5, Cu, Al)

670-K. Plug Welding Shortcuts Jacketed Vessel Production. *Steel,* v. 127, Nov. 6, 1950, p. 89.

How pressure jackets are fastened to the inside liners of stainless process vats by a fast semi-automatic plug welding method. (K1, SS)

671-K. Design and Installation of Large-Diameter Long-Span Welded Pipe. H. Jackson. *Welding Journal,* v. 29, Nov. 1950, p. 957-961.

Use of rigid ring girders at points of support to prevent distortion throughout the length of the span. Field erection and welding methods. (K1, CN)

672-K. Spot Welder Secondary Current Measurement. I. C. McKechnie. *Welding Journal,* v. 29, Nov. 1950, p. 962-964.

New method and its "repeat accuracy" (variability at a given control setting). Formulas for determining weldabilities of various materials, and for calculating currents, times, and pressures required for specific welds. (K3)

673-K. Spot and Seam Welding of Aircraft Using D.C. Current. J. H. Cooper. *Welding Journal,* v. 29, Nov. 1950, p. 965-972.

Field performance of "Tri-phase" dry-disc-rectifier d.c. welders in a number of high-production installations for Al alloys, stainless steels, Ni alloys, and carbon steels. Case histories from nine companies. (K3, CN, SS, Al, Ni)

674-K. Reclamation of Diesel Locomotive Parts. La Motte Grover and R. L. Rex. *Welding Journal,* v. 29, Nov. 1950, p. 973-980.

Miscellaneous repair and maintenance welding jobs on ferrous and nonferrous parts using arc welding, inert-gas shielded arc, and gas welding. Also hard facing. (K1, K2, L24, T23)

675-K. Automatic Welding in Steel Mill Maintenance. William P. Hoffman. *Welding Journal,* v. 29, Nov. 1950, p. 989-994.

Various examples at Wisconsin Steel Div., International Harvester Co., Chicago. (K1, A5, ST)

676-K. Welding of Farm Tractors. J. Leonard Buchholz. *Welding Journal,* v. 29, Nov. 1950, p. 995-1000.

Practically every welding process for steel and gray iron is used. Redesign of parts to welded construction. (K general, T3, ST, CI)

677-K. Cast Iron Repair. A. J. Beldon. *Welding Journal,* v. 29, Nov. 1950, p. 1001.

How a large cast iron mill was repaired by fusion welding with cast iron rod. It would have been easier to repair it by bronze welding, but in service the mill holds cyanide solutions that would attack a bronze weld. (K2, CI)

678-K. Welding in the Oil Fields. *Welding Journal,* v. 29, Nov. 1950, p. 1002-1004.

Miscellaneous equipment and applications. (K general, T28)

679-K. Diesel Manifolds Economically Repaired. *Welding Journal,* v. 29, Nov. 1950, p. 1004.

Use of inert-gas shielded-arc welding. (K1, CN)

680-K. Effect of Welding on the Properties of Titanium-Carbon Alloys. E. M. Mahla and R. B. Hitchcock. *Welding Journal,* v. 29, Nov. 1950, p. 544s-551s.

The inert-gas shielded tungsten-arc process was found to be satisfactory for welding Ti-C alloys. 0.25% C is the maximum permissible for ductile welds in the as-welded condition. Bend, tensile, and corrosion-test data, as well as results of metallographic studies. (K1, Q general, Ti, C-n)

681-K. Welding Air-Hardening Alloy Steels. Walter H. Wooding. *Welding Journal,* v. 29, Nov. 1950, p. 552s-564s.

Investigation of various procedures for shielded metal-arc welding of an air-hardening alloy steel indicated that isothermal transformation characteristics of the heat-affected zone considerably influenced weldability of the material under high restraint. Above the temperature at which the martensite transformation begins, the heat-affected zone is very sensitive to thermal shock and prone to underweld

cracking. This cracking persists until the bainite transformation approximates 8%. Heat-affected zones exhibiting partial martensite transformation are likewise sensitive to underweld cracking unless tempered prior to thermal shock. Effect of preheat upon cooling rates. (K1, K9, N8, AY)

682-K. How a Zinc Smelter Utilizes Welding for Maintenance and Fabrication. Harold Hodnick and Jack Meredith. *Industry & Welding,* v. 23, Nov. 1950, p. 22-23, 64-65.

Arc welding, flame cutting, gas welding, lead burning, etc. (K general)

683-K. Design Analysis of a Large Weldment. L. G. Hauser. *Industry & Welding,* v. 23, Nov. 1950, p. 26-28, 50-51.

As applied to the rotor spider of a hydro-electric generator. Materials are SAE 1015 and 1035. (K general, T25, CN)

684-K. Machine Welding in the Field. William R. Harper. *Petroleum Engineer,* v. 22, Nov. 1950, p. D36-D38.

Equipment and procedure for welding sections of pipeline together in the field. An internal clamp holds 30-in. o.d. pipe in position while it is rotated under the welding head. (K1, CN)

685-K. Stud Welding Cuts Costs in Tractor Handle Assembly. *Product Engineering,* v. 21, Nov. 1950, p. 101. (K1)

686-K. A Nickel-Chromium-Iron Alloy for Sealing to Glass. J. E. Stanworth. *Journal of Scientific Instruments,* v. 27, Oct. 1950, p. 282-284.

Development of alloy containing 47% Ni and 5% Cr and matching ordinary lead glass as used in manufacture of electrical lamps and tubes. Stresses in seals made with this material are low at all temperatures. (K11, T1, Ni, Fe)

687-K. Strato Ships Spot Welded. Howard E. Jackson. *Welding Engineer,* v. 35, Nov. 1950, p. 17-19.

Procedures at Boeing. Includes surface cleaning procedures. (K3, L12, Al)

688-K. Inert-Arc Welding of Everdur Beer Filter. A. C. Kracklauer. *Welding Engineer,* v. 35, Nov. 1950, p. 26-28. (K1, Cu)

689-K. All-Aluminum Guard Rail. J. I. Medoff. *Welding Engineer,* v. 35, Nov. 1950, p. 29.

Weld fabrication of rail for a Philadelphia highway bridge from 61S-W Al alloy. (K1, T26, Al)

690-K. Building a Kurtis-Kraft Sportscar. James Joseph. *Welding Engineer,* v. 35, Nov. 1950, p. 30-31.

Use of arc and spot welding in production of racing-car bodies. (K1, K3, T21, CN)

691-K. How Britain Uses Stud Welding. Fred Brewster. *Welding Engineer,* v. 35, Nov. 1950, p. 32-33, 37.

How Cyc-Arc process operates and its applications to ferrous and nonferrous compounds. (K1)

692-K. 10 Jobs in the Oil Fields. Elton Sterrett. *Welding Engineer,* v. 35, Nov. 1950, p. 34-37.

Ten maintenance and construction jobs for which welding is used. (K general, T28)

693-K. Trade Names of Electrodes and Comparable AWS-ASTM Designations. *Welding Engineer,* v. 35, Nov. 1950, p. 49.

A table. (K1, T5)

694-K. Some Aspects of Metallic Arc Welding of Sheet Metal. A. G. Thompson. *Sheet Metal Industries,* v. 27, Oct. 1950, p. 879-883.

Equipment, welding conditions, design for sheet-metal work, fit-up and jigging, electrodes, and procedures. (K1)

695-K. Joining Nimonic. *Aircraft Production,* v. 12, Sept.-Oct. 1950, p. 265-269.

The Wiggin series of high-Ni alloys, and recommended procedure for soldering, brazing, and welding. (K general, Ni)

696-K. Basic Principles of Arc Welding. Rolt Hammond. *Machinery Lloyd* (Overseas Edition), v. 22, Oct. 14, 1950, p. 68-71, 73, 75.

Clarified by diagrams. (K1)

697-K. Effect of Cooling Rate and Composition on the Embrittlement of Weld Metal. E. C. Rollason and R. R. Roberts. *Journal of the Iron and Steel Institute,* v. 166, Oct. 1950, p. 105-112.

Tensile specimens of extremely rapidly cooled (e.g. 1400° C. per min.) mild steel weld metal have low ductility associated with woody fractures. In welds with high hydrogen content, microfissures similar to hairline cracks were also found, and these prevent complete recovery of ductility by tempering at 650° C. Extent of fissuring was shown to be related to H_2 and N_2 contents of the weld. Suggests that fissuring is caused by the embrittling effect of H_2 on regions of the weld already reduced in ductility by the presence of C and N_2-rich intermediate transformation products of austenite. A study was made of effects on fissuring and N_2 solubility of alloy additions to weld metal. (K9, Q23, CN)

698-K. Welding of Aluminium Alloys. G. S. Misra. *Transactions of the*

Indian Institute of Metals, v. 1, Apr. 1949, p. 249-295; discussion, p. 296.

The different methods of welding Al and its alloys. Metallurgical characteristics which influence the welding procedure. Applications and methods of gas, flame, and electric welding as well as cold and pressure welding. Differences between welding techniques for steel and Al. 24 ref. (K general, Al)

699-K. Gray Iron: Welding; Joining; Cutting. C. O. Burgess. *American Foundryman,* v. 18, Oct. 1950, p. 50-57; Nov. 1950, p. 44-48.

Elevated temperature methods of welding, joining, and cutting gray iron. Material will constitute Chapter VII of the "Gray Iron Handbook". (To be continued.) (K general, CI)

700-K. Hints on How To Weld Sheet Lead. *Power Engineering,* v. 54, Nov. 1950, p. 82-83.

(K general, Pb)

701-K. A Survey of Aluminum Welding Techniques. (Concluded.) Floyd A. Lewis. *Tool Engineer,* v. 25, Nov. 1950, p. 28-31.

Gas-shielded arc welding, carbon-arc welding, atomic-hydrogen welding, seam welding, and flash welding. (K1, K3, Al)

702-K. Simulated Test Conditions Eliminate Brazing Defects. *Steel,* v. 127, Nov. 20, 1950, p. 99.

Simple test for brazability of cupro-nickel. During casting of each heat, a test coupon is taken. This sample is rolled to a thinner gage, then held in a tube furnace for 15 min. at 2050° F., duplicating conditions of actual brazing. A bright surface after this treatment indicates good brazability. (K8, Cu)

703-K. Welding Quality Control in a Petroleum Refinery. A. F. Blumer. *Petroleum Refiner,* v. 29, Nov. 1950, p. 101-108.

Welding quality control consists of qualification testing of welders, continued sampling and welding inspection on jobs in progress, testing and selection of suitable electrodes, adherence to welding procedures and job specifications, and evaluation and use of new developments in welding. (K general, S general)

704-K. How To Control Welding Quality. A. F. Blumer. *Petroleum Processing,* v. 5, Nov. 1950, p. 1192-1195. (A condensation.)

See preceding abstract, item 703-K. (K general, S general)

705-K. The Design and Fabrication of Welded Structures Subjected to Repeated Loading. Part V. R. Weck. *Welder,* v. 19, Apr.-June 1950, p. 43-46.

Fatigue strength of riveted joints and the effect of single beads of weld metal on the fatigue strength of plate materials. References to recent literature. (To be continued.) (K general, Q7, CN)

706-K. Physical Aspects of Weldability of Glass to Metal in the Electron-Tube Industry. I. The Problem of Weldability of Glass to Metal From the Physical Point of View. II. Determination of Optimum Annealing Cycles for Glass Alone and for Glass-Metal Bonds. (In French.) Georges Trébuchon and Jacques Kieffer. *Verres et Réfractaires,* v. 4, June 1950, p. 135-157; Aug. 1950, p. 230-247.

Phenomena producing stresses at different temperatures of the surrounding atmosphere in the glass-metal bond were investigated. Experimental methods and the theoretical interpretation of such phenomena. 18 ref. (To be continued.) (K11)

707-K. Welding and Brazing of Monel, Nickel, and Inconel. (In French.) A. Boutté. *Soudure et Techniques Connexes,* v. 4, Jan.-Feb. 1950, p. 29-32; Mar.-Apr. 1950, p. 76-80; May-June 1950, p. 119-125; July-Aug. 1950, p.159-164.

A comprehensive survey of modern methods. Theoretical bases of each process. Optimum conditions for individual methods of welding and brazing and spheres of application. (K general, Ni)

708-K. Contribution to the Study of Welding Torches. (In French.) H. Lagarde. *Soudure et Techniques Connexes,* v. 4, July-Aug. 1950, p. 149-158; discussion, p. 158.

Different types used for oxy-acetylene welding. Factors influencing operation, including material used for different components of the torch. (K2, T5)

709-K. Furnace Brazing. (In French.) A. Normand. *Soudure et Techniques Connexes,* v. 4, July-Aug. 1950, p. 165-166.

Method is particularly applicable for the rapid joining of relatively lightweight components, the size of which permits heating in a furnace. Optimum conditions of operation. (K8)

710-K. Concerning the Quality of Welds Obtained by Automatic Welding Under Winter Conditions. (In Russian.) B. I. Medov and A. E. Asnis. *Avtogennoe Delo* (Welding), v. 21, Aug. 1950, p. 1-8.

Investigated for low-carbon steel of ordinary thicknesses. It was found that impact strength and brittleness under winter conditions are essentially the same as under stand-

ard conditions. Probability of formation of pores and cracks increases due to increase of rate of cooling. Conditions under which welding at freezing temperatures is permissable were determined. (K1, CN)

711-K. Mechanization of Assembly-Welding Operations in the Production of All-Metal Automobile Bodies. (In Russian.) N. A. Chuvakov and V. I. Gorbachev. *Avtogennoe Delo* (Welding), v. 21, Aug. 1950, p. 9-12.

As practiced in the U.S.S.R. (K1, T21, CN)

712-K. Three-Phase Arc-Welding Apparatus. (In Russian.) N. S. Siunov. *Avtogennoe Delo* (Welding), v. 21, Aug. 1950, p. 12-15.

Apparatus with which welding is performed manually. Use of the three-phase arc was found to markedly increase the productivity, simplify the technique, improve the quality of the work, and save 20-25% on power. Operating characteristics. (K1)

713-K. Welding Under Flux of Parts Having a Complex Shape. (In Russian.) Ya. A. Zav'yalov, M. S. Khatsko, and V. I. Makhanev. *Avtogennoe Delo* (Welding), v. 21, Aug. 1950, p. 15-17.

Welding 3-4 mm. sheets of low-carbon steel. Details of technique for a series of examples. A semi-automatic apparatus was used. (K1, CN)

714-K. Application of Electrical Heating for Hard Soldering. (In Russian.) L. V. Glebov and S. V. Livshits. *Avtogennoe Delo* (Welding), v. 21, Aug. 1950, p. 24.

A method of electrically heating parts to be soldered to improve quality of the joints obtained. Special applications of the method. (K7)

715-K. Electrodes for Welding Structural Steels. (In Russian.) S. K. Zveg'intsev and E. A. Sirota. *Avtogennoe Delo* (Welding), v. 21, Aug. 1950, p. 25-27.

Characteristics of four electrodes used for welding low-alloy structural steels. Basic characteristics of the compositions are use of basic coatings containing marble, fluorspar, etc., as slag formers; presence of ferro-alloys (ferrosilicon, ferromanganese, ferrotitanium) of the fused metal; and low content of harmful impurities (sulfur and phosphorus). Welding characteristics of individual electrodes. (K1, T5, CN)

716-K. (Book) **Procedure Handbook of Arc-Welding Design and Practice.** Ed. 9. 1200 pages. 1950. Lincoln Electric Co., 12818 Coit Rd., Cleveland. $2.00.

Completely reorganized and re-edited. Latest procedures for welding all metals and alloys commonly welded with manual open-arc and hidden-arc welding, as well as automatic and semi-automatic hidden-arc welding. A new chapter on weldability. Facts revealed by research projects and recent studies. (K1)

717-K. (Book) **Manuel de Soudure Electrique a l'Arc.** (Manual for Electric-Arc Welding). Ed. 3. Ed. Henrion and F. M. L. Van Horenbeeck. 174 pages. 1948. Desoir, Liege, Belgium.

Theoretical basis presented in popular form. Methods and techniques; problems and test methods. (K1)

718-K. (Book) **Die Grauguss-Gasschweissung leicht gemacht.** (Gas Welding of Grey Cast Iron Made Easy). F. Wuttke. 89 pages. Carl Marhold Verlagsbuchhandlung, Halle-saale, Germany. 6.75 DM.

Essentially a practical repair manual. Deals with the detection of cracks, preparation of the weld area, preheating methods, and recommended welding techniques. (K2, CI)

719-K. Resistance Welding Controls—Why So Many? W. E. Large. *Iron Age*, v. 166, Nov. 23, 1950, p. 64-67.

The functions of the many different types of welding controls. Selecting the least expensive control consistent with the requirements of a given job. (K3)

720-K. New Applications Broaden Heatless Welding Uses. *Steel*, v. 127, Nov. 27, 1950, p. 71.

Several new modifications of the Koldweld process. A number of new applications to various nonferrous metals. (K5, EG-a)

721-K. Latest Developments in Cold Pressure Welding Widen Its Field of Application. William Dubilier. *Materials & Methods*, v. 32, Nov. 1950, p. 78-80.

An illustrated survey. (K5, Al, EG-a)

722-K. The 1949 Smit Unionmelt Conference. (In Dutch.) *Smit Mededelingen*, v. 5, July-Sept. 1950, p. 73-94.

Introductory remarks plus the following brief articles: "Unionmelt Welding of Thin Plates", Th. Neyboer; "Right-Angle Welding With the Unionmelt Apparatus", C. J. Verzijlbergh; "Unionmelt Welding Outdoors", C. J. Verzijlbergh; "Use of Unionmelt Powder"; "Characteristics of Currents Used in Unionmelt Welding"; "Unionmelt Welding of Non-Rusting and Other Non-Corroding Types of Steel (Also of Copper and Its Alloys, Nickel, and Monel)"; and "Combined Unionmelt and Manual Welding". (K1)

723-K. Production of Glass-Lined Tanks. *Industrial Heating,* v. 17, Nov. 1950, p. 1942-1944, 1946, 1948.

Equipment and procedures at A. O. Smith Corp. Includes frit production, tank fabrication by plate bending and welding, cleaning of internal metal surfaces, spray application of glass frit, and firing. (K11, T26, CN)

724-K. Simplified Bumper Assembly. *Applied Hydraulics,* v. 3, Dec. 1950, p. 21-22.

Completely automatic, hydraulically powered and electric-controlled machines used by Standard Steel Spring Co., Coraopolis, Pa., to rivet bumper face-bars assemblies for a leading automobile manufacturer. (K13, T21)

725-K. More Kitchen Cabinets in Less Time. *Steel,* v. 127, Dec. 4, 1950, p. 104.

Jigs and fixtures for resistance welding of kitchen cabinets at Lyon Metal Products Inc. (K3, T10, CN)

726-K. Welded Design in Machine Bases. *Industry & Welding,* v. 23, Dec. 1950, p. 24-26, 48.

Production by H. F. Butler, Inc., Union, N. J. Use of arc welding, oxy-acetylene cutting and some oxy-acetylene welding. (K1, K2, CN)

727-K. Resistance Welding Builds Model Trains. *Industry & Welding,* v. 23, Dec. 1950, p. 28.

Procedures and equipment of Lionel Corp. (K3)

728-K. A Combination of Engineering and Welding "Know-How" Helps Budd To Produce Stainless Steel Rail-Cars. Byron Gates. *Industry & Welding,* v. 23, Dec. 1950, p. 36-38, 46-47.

Resistance welding equipment and methods. (K3, T23, SS)

729-K. Arc Welding: Maintenance Tool. *Power,* v. 94, Dec. 1950, p. 109, 112.

Survey includes list of metals and alloys which can be arc welded. (K1)

730-K. Why Consider Adhesive Bonded Structures? Seth Gunthorp and Richard G. Naugle. *Product Engineering,* v. 21, Dec. 1950, p. 138-143.

How bonds are made. U. S. Air Force specifications, also characteristics of some typical metal bonding adhesives. Joint-strength data and advantages. (K12)

731-K. Welding Heat Treatable Aluminum Alloys. B. B. Burbank. *Journal of the American Society of Naval Engineers,* v. 62, Nov. 1950, p. 811-822.

The Heliarc and Aircomatic inert-gas shielded processes. Includes diagrams and graphs showing mechanical-property gradients through the weld zone. (K1, Al)

732-K. Applications for Helium in Inert-Arc Welding. M. J. Conway. *Journal of the American Society of Naval Engineers,* v. 62, Nov. 1950, p. 1012-1016.

Reprinted from *Welding Journal.* See item 411-K, 1950. (K1)

733-K. New Welding Method Cuts Pump Fabrication Time. Earl Knowlton. *Western Metals,* v. 8, Nov. 1950, p. 24-25.

Total time for welding applications in the fabrication of high-pressure boiler feed-water pumps at Byron Jackson Co. has been cut from 20 hr. to 2½ hr. by introduction of Unionmelt welding. Forgings are mild steel (AISI 1020) and may weigh as much as two tons. (K1, CN)

734-K. Metal-Ceramic Sealing With Manganese. H. J. Nolte and R. F. Spurck. *Tele-Vision Engineering,* v. 1, Nov. 1950, p. 14-16, 18, 39.

Process used in ceramic-envelope tube production which permits bonding of a layer of molybdenum to the ceramic, previous to brazing. This method insures good bonding with all ceramics without use of finely divided powders and special protective atmospheres. The metallizing mixture is applied by spraying or brushing, then bonded by heating in a protective atmosphere. W, Fe, Ni, and possibly other metals may be substituted for Mo. Brazing is done at any time after the firing operation. (K11, Mo)

735-K. Welding Innovations at Ryan. William P. Brotherton. *Western Machinery and Steel World,* v. 41, Nov. 1950, p. 92-93.

Two-tip and three-tip oxy-acetylene welding torches designed for special jobs on stainless steel. The two-tip torch steps up production of exhaust systems by performing two operations simultaneously—trimming the extra flange metal and welding the seam. The three-tip torch has a pair of natural-gas tips in addition to the oxy-acetylene tip. The natural gas is burned ahead and behind the welding tips for pre-heating and postheating of the steel. (K2, SS)

736-K. Welding High-Temperature Piping. E. C. Bailey. *Welding Engineer,* v. 35, Dec. 1950, p. 34-37.

Arc welding and gamma-ray inspection of 1% Cr, 0.5% Mo piping designed for steam at 1800 psi. and 1050° F. (K1, AY)

737-K. Transformers Fastened by Stud Welding. *Welding Engineer,* v.

35, Dec. 1950, p. 38-39.

Studs are welded to the inside and outside of transformers at Westinghouse. They serve many varied purposes. (K1, T1, CN)

738-K. Aluminium Window Production; A New Flash-Welding Application. *Welding,* v. 18, Nov. 1950, p. 464-471.

Some of the early developments in this field, latest types of equipment used, and general methods of fabrication. (K3, T26, Al)

739-K. Light Gauge Arc Welding; Applications of the "Carbo-Flux Process". *Welding,* v. 18, Nov. 1950, p. 473-480.

Process, depends upon use of special flux-coated filler rods and a flux coating applied to the sheets prior to welding. Used for welding thin sheets of stainless steel, Ni alloys, galvanized iron, mild steel, and copper. (K2)

740-K. The Automatic Flash Welding Machine. (Concluded.) A. G. Galle and C. A. Burton. *Welding,* v. 18, Nov. 1950, p. 481-486.

Various components designed for welding in this apparatus. Machine settings are tabulated and charted. (K3)

741-K. Design Economies in Platework. *Welding,* v. 18, Nov. 1950, p. 487-496.

When a component is produced by a forming operation that involves plastic flow during formation, one of the greatest difficulties encountered is accurate determination of size and shape of the blank from which the component is to be formed. A new method is based on use of thin sheets of methacrylate resin to form scale models of the component. How this procedure was applied to design of a large spherical tank made of a number of irregular-shaped pieces. Procedure for erection and welding of the final tank. (K general, T26)

742-K. All-Welded Mine Trains. J. V. Thomas. *Welding,* v. 18, Nov. 1950, p. 496-498.

(K general, T28, CN)

743-K. Weld Design and Production as an Important Factor in the Economics of Machine Construction. (In German.) F. W. Griese. *Schweissen und Schneiden,* v. 2, Sept. 1950, p. 232-246; Oct. 1950, p. 259-269.

Part I: Cost savings by substitution of welding for casting in production of heavy machinery and structures. Design and material factors. Part II shows that the welding method permits great versatility of design and production methods. (K general, CN)

744-K. Contact Electric Arc Welding. (In German.) P. C. Van Der Willigen. *Schweissen und Schneiden,* v. 2, Oct. 1950, p. 270-278.

Process for steel welding developed in Holland. Iron powder of the same composition as the core is dispersed in the welding-rod coating. This makes it possible to move the rod along the work while maintaining actual contact with it, thus minimizing skill required. Strengths of the welds are shown to be superior. (K1, ST)

745-K. Designing a Large Weldment. L. G. Hauser. *Machine Design,* v. 22, Dec. 1950, p. 168-170.

Previously abstracted under similar title from *Engineering Experiment Station News* (Ohio State University). See item 450-K, 1950. (K1, CN)

746-K. Applying Aluminum Roofing by Stud Welding. *Sheet Metal Worker,* v. 42, Dec. 1950, p. 74-75.

(K1, T26, Al)

747-K. Furnace Brazing of Machine Parts. Part 1. Where, Why, and How Electric-Furnace Brazing Is Being Used in 1950. Part 2. Fixtures, Joint Types, Fits, Metals and Their Properties, and Typical Furnaces Used in Brazing. H. M. Webber. *Mechanical Engineering,* v. 72, Nov. 1950, p. 863-869; Dec. 1950, p. 969-976.

16 references. (K8)

748-K. Engineering Aspects of Tool and Die Welding. Part I. Arthur R. Butler. *Tool Engineer,* v. 25, Dec. 1950, p. 21-23.

Tool and die welding is defined as the deposition by the metallic arc, atomic hydrogen, or oxy-acetylene processes of the basic types of toolsteels. The metallic arc process and the metallurgy of welding. Selection of electrodes for welding applications shown in condensed tabular form. (To be continued.) (K1, L22, TS)

749-K. A Survey of Modern Theory on Welding and Weldability. (Continued.) D. Séférian. *Sheet Metal Industries,* v. 27, Nov.-Dec. 1950, p. 935-949, 952.

Weldability of carbon steels; nomenclature of steel constituents (structural phases); physical and chemical aspects of welding; determination of weldability; and structural investigation of welded joints. 19 ref. (To be continued.) (K9, ST)

750-K. Progress in Welding, 1929-1950. A. J. Hipperson and R. G. Burt. *Metallurgia,* v. 42, Nov. 1950, p. 347-349. Descriptive review. (K general)

751-K (Book) **Modern Welding Technique.** E. T. Gill and E. N. Simons. 276 pages. Sir Isaac Pitman & Sons, Ltd., 39 Parker St., Kingsway, London W.C.2, England. 21s.

Primary aim is to serve as a textbook for the student who has no previous knowledge of welding. (K general)

752-K. (Book) **Application of Arc Welding.** (In English.) 327 pages. Elektriska Svetningsaktiebolaget, Sweden. 21s.

Contains 15 papers selected by the judges of an international prize competition. Although a good proportion of the treatises are by Swedish authors, there are also papers from other countries. Divided into various sections: machinery, shipbuilding, bridges, buildings; conveyance and transport; large pressure vessels, containers, and piping. The papers are concerned mainly with redesign and new design of different types of structures and include many detailed drawings, strength calculations, and cost data. (K1)

SECTION L

CLEANING, COATING and FINISHING

1L. Automatic Hard Facing Improves Quality, Cuts Costs. Eldon C. Hurt. *American Machinist,* v. 93, Dec. 29, 1949, p. 87-89.

Greater uniformity, reduced alloy consumption, less porosity, smoother deposits, and shorter machining time are claimed for automatic process. (L24)

2L. Finishing Treatments for Magnesium. II. Jerome L. Bleiweis. *American Machinist,* v. 93, Dec. 29, 1949, p. 113.

Purpose, nature of coating, and procedure for the dichromate process and the modified alkali-chromate treatments. (L14, Mg)

3L. Continuous Coating Units. H. W. Lynn. *Blast Furnace and Steel Plant,* v. 37, Dec. 1949, p. 1463-1465.

Hot-dip coil-galvanizing line recently installed by Weirton Steel Co. Successive operations are cold rolling, electrolytic and mechanical cleaning, annealing, flat rolling, galvanizing and associated operations; and final cleaning, leveling, shearing, etc. (L16, A5)

4L. The Nash Automobile Finish. John Wieland. *Industrial Finishing,* v. 26, Dec. 1949, p. 30-32, 34, 36, 38.

How bodies are cleaned, rustproofed, primed, baked, wet sanded, dried and cleaned again, painted in color, and baked. (L general, T21)

5L. Chemical Dip Polishes Metal to High Luster. *Industrial Finishing,* v. 26, Dec. 1949, p. 56, 58.

Metal products can be given a bright, reflective surface without mechanical or electrical operations by a new process recently developed by Battelle Memorial Institute. The product to be finished is merely dipped into a chemical solution. Metals that can be chemically polished successfully include brass, copper, nickel-silver, Monel, nickel, and aluminum. (L12)

6L. Priming Coat for Light Metals. Gilbert C. Close. *Light Metal Age,* v. 7, Dec. 1949, p. 6-8.

New primer consists merely of ordinary Zn chromate fortified with synthetic resin. Comparative corrosion resistance of Al and Mg panels primed with the new and old materials. (L14, Al, Mg)

7L. Brush Finishing for Appearance and Corrosion Resistance. R. O. Peterson. *Sheet Metal Worker,* v. 41, Dec. 1949, p. 42-43.

(L10)

8L. The Application of Phosphate Coating to Wire. H. A. Holden and S. J. Scouse. *Wire Industry,* v. 16, Dec. 1949, p. 969-971.

Recommended procedures. (L14)

9L. Properties of Gold Deposited at Liquid Air Temperature. P. G. Wilkinson and L. S. Birks. *Journal of Applied Physics,* v. 20, Dec. 1949, p. 1168-1171.

Gold deposited in vacuum at liquid-air temperature contained defects and strain. The number of defects and their characteristic decay energy increased rapidly with increasing rate of deposit. The defects decayed with rising temperature but relief of strain did not occur until after most of the defects had disappeared. Electron micrographs showed that the gold film was made up of aggregations of discrete particles rather than a smooth continuous film. (L25, Au)

10L. Recent Advances in Offset Lithography For Metal Decoration. William F. May. *National Lithographer,* v. 56, Dec. 1949, p. 26-27, 75, 77, 81.

Advances of the past 20 years. (L26)

11L. Fifty Years of Metal Decorating. C. W. Dickinson. *National Lithographer,* v. 56, Dec. 1949, p. 28-29, 66.

Equipment for printing on metal at various periods since 1899. (L26)

12L. The Coating Machine; Applying Controlled Finishes. Christian F. Scheehle, Jr. *National Lithographer,* v. 56, Dec. 1949, p. 30-31, 87, 89.

Development of equipment for application of decorative and protective coatings on metal. (L26)

13L. Wonder of the Graphic Arts Inks for Metal Decorating. O. C. Holland. *National Lithographer,* v. 56, Dec. 1949, p. 32-33, 66.

Properties of modern metal-decorating inks. (L26)

14L. The Metal Decorating Oven Today. Oscar Byron. *National Lithographer,* v. 56, Dec. 1949, p. 34-35, 81, 83, 85.

Construction and operation. (L26)

15L. What's Wrong With the Finish? J. E. Hanley and T. R. Brown. *National Lithographer,* v. 56, Dec. 1949, p. 36-37, 94-95.

Troubles that may be encountered in the application of a finish by a roller-coating machine followed by baking in a conventional metal-decorating oven. (L26)

16L. Photo-Composing or Step & Repeat Machines. Michael Annick. *National Lithographer,* v. 56, Dec. 1949, p. 40, 96-97.

Place of the photo-composing machine in the metal-decorating industry. (L26)

17L. Italian Research on Electrodeposition of Metals; The Work of Professor R. Piontelli. *Metallurgia,* v. 41, Nov. 1949, p. 22-25.

The general electrochemical behavior of metals, their behavior in concentration cells, electrodeposition of alloys, and auto-displacement of lead. (L17)

18L. Stainless-Clad Plates: Colvilles' New Process. John Erskine. *British Steelmaker,* v. 15, Dec. 1949, p. 592-596.

New British patented process in which a stainless-steel slab is coated on one side with mild-steel by arc welding. The coated slab is then rolled to the desired thickness. This thin sheet is then bonded to the mild-steel base in the usual manner, with the stainless side out. Mechanical properties of the product. (L22, SS)

19L. Stainless Clad Steels. J. Lomas. *Machinery Lloyd* (Overseas Edition), v. 21, Dec. 3, 1949, p. 75, 77.

Production methods. (L22, SS)

20L. Abrasive Blast Equipment for Cleaning Steel Drums. J. F. Farrell. *Organic Finishing,* v. 10, Dec. 1949, p. 8-10, 21.

Cleaning and reconditioning of steel drums prior to the application of paint or plastic coatings. (L10)

21L. Surface Treatment. *Steel,* v. 126, Jan. 2, 1950, p. 204-206, 208.

Brief reviews and forecasts: Predicts Infrared Oven Expansion Program, R. J. Carter. New Porcelain Enamel Frits Reduce Material Costs, E. Hogenson. Continuous Strip Annealing to Aid Tin Plate Producers, A. E. Kadell. New Steel Enameling Sheet Eliminates Ground Coat, G. H. McIntyre. Surface Preparation Key to Finishing Progress, C. B. F. Young. Demand Seen for Improved Galvanizing Practice, Wallace G. Imhoff. Industrial Finishes Provide Eye-Appeal, B. F. Ames. Aluminum Wire Industry Makes Great Strides, Henry C. Boynton. Chemical Coating Facilitates Drawing of Stainless Tubing, V. M. Darsey. Sheets Now Are Galvanized by Continuous Process, T. F. Olt. Popularity of Titanium Enamels Gradually Increasing, W. A. Deringer. Galvanizers Review Coating Specifications, Fred C. Brightly, Jr. New Developments to Tumble Metal Finishing Costs, Myron B. Diggin. Better Quality, Lower Cost Demanded of Finishes, Richard O. Loengard. (L general)

22L. The Electrodeposition of Zinc on Zinc Starting Sheets. Glen C. Ware, Henry E. Blake, Jr., and Kenneth B. Higbie. *Journal of the Electrochemical Society,* v. 96, Dec. 1949, p. 335-346.

Conditions necessary for making thick electrodeposits of Zn on zinc starting sheets were investigated in order to eliminate stripping costs and reduce melting losses which occur when using Al starting sheets. Finished cathodes as thick as 2.6 in. were produced on sheets rolled from four-nines Zn and cathodes as thick as 1 in. on sheets of commercial-grade Zn. (L17, Zn)

23L. Experiments in Chromium Electrodeposition With Radioactive Chromium. Fielding Ogburn and Abner Brenner. *Journal of the Electrochemical Society,* v. 96, Dec. 1949, p. 347-352.

Any used chromic acid electroplating bath contains some trivalent Cr. Whether the metal is deposited from this bath directly from the hexavalent state or through the trivalent state has never been conclusively demonstrated. Tagging the Cr with a radioactive isotope indicates that it is deposited directly from the hexavalent and not from the trivalent state. (L17, Cr)

24L. The Functions and Uses of Hardfacing. Part II. J. J. Barry. *Steel Processing,* v. 35, Dec. 1949, p. 641-644.
Typical applications of each of the four types. (L24)

25L. Large Scale Finishing of Die-Castings. *Plating,* v. 37, Jan. 1950, p. 44-48.
Procedures and equipment, including buffing, electroplating, and application of paint-type finishes. (L general)

26L. Preparation of High-Carbon Steel for Electroplating. *Plating,* v. 37, Jan. 1950, p. 59-61, 68.
ASTM Tentative Recommended Practice B242-49T. (L17, CN)

27L. Determination of Impurities in Electroplating Solutions. XVI. Traces of Chloride in Copper Plating Baths. Earl J. Serfass and Mary H. Perry. *Plating,* v. 37, Jan. 1950, p. 62-66.
Development of a colorimetric method. Small amounts of Pb, CrO_3, ferric ion, Ca, Al, Na, Ni, Si, or sugar do not interfere. Accuracy is 5%. 23 ref. (L17, S11, Cu)

28L. The German Ferrous Metal Industry; Development of Hard Metals and Coatings. *Chemical Age,* v. 61, Dec. 3, 1949, p. 772-774.
Based on a section of BIOS Overall Report No. 15: "The Ferrous Metal Industry in Germany During the Period 1939-1945". (L24)

29L. Preliminary Report of Developments in Interrupted Surface Finishes. L. S. Martz. *Institution of Mechanical Engineers, Proceedings,* v. 161, War Emergency Proceedings No. 47, 1949, p. 1-5; discussion, p. 6-9.
Results of service use and laboratory tests of three generic types: mechanically, chemically, and electrolytically generated surface finishes and their combinations. Such surfaces are shown to have promise for bearing use. 22 ref. (L general)

30L. Greater Production and Improved Economy by Use of New Galvanizing Settings at Niles Rolling Mill. Eugene Boron. *Industrial Heating,* v. 16, Dec. 1949, p. 2126-2128, 2130, 2132, 2134, 2136, 2254, 2256.
New galvanizing heating equipment. (L16)

31L. Phosphate Coating and Finishing of Tracy Kitchen Cabinets. *Industrial Heating,* v. 16, Dec. 1949, p. 2202-2204, 2206, 2208, 2210-2211, 2213.
Equipment and procedures. (L14, T10)

32L. The Plating Shop "Quick". James E. Bottomley. *Electroplating and Metal Finishing,* v. 3, Dec. 1949, p. 119-120.
The mercury cyanide dip solution is known as the "quick". Periodic determination of the mercury content of three quicking solutions during several weeks of use indicates that there is little danger of the solution becoming too low in Hg content, although too much Hg is harmful. (L17)

33L. Control of Electroplating Solutions by Analysis and Observation. X. Control of Silver Plating Solutions. K. E. Langford. *Electroplating and Metal Finishing,* v. 3, Dec. 1949, p. 121-122. (L17, Ag)

34L. Anodic Treatment of Aluminium Alloys. Jaime Estruch. *Electroplating and Metal Finishing,* v. 3, Dec. 1949, p. 123-125. An abridged translation of a paper presented at the International Automobile Congress in Turin, Italy.
Three stages in the development of a universal electrolyte are: first, modifications to known electrolytes for the treatment of specific alloys; second, a phosphoric-sulfuric acid electrolyte containing phthalates or phenolates; and third, an electrolyte which cleans, pickles, and brightens simultaneously when the article is made the cathode and which anodizes when the current is reversed —in other words, a one-bath process applicable to all Al-base alloys. (L19, Al)

35L. Determination of Sulphates in Nickel Plating Solutions. V. F. Toropova, F. A. Zimkin, and A. A. Popel. *Electroplating and Metal Finishing,* v. 3, Dec. 1949, p. 132-133.
Previously abstracted from *Zavodskaya Laboratoriya* (Factory Laboratory). See item 8-202, 1949. (L17, S11)

36L. The Hot Spray Process for Organic Finishes. James A. Bede. *Finish,* v. 7, Jan. 1950, p. 25-27, 73-74, 76.
Equipment, effect of materials and spraying technique, and results that may be expected. (L26)

37L. Adherence of Sheet Steel Ground Coats as Influenced by Titania Mill Additions. Leonard Witt and R. M. King. *Finish,* v. 7, Jan. 1950, p. 28-29.
Data for a wide range of compositions of TiO_2 with Co_3O_4 and NiO. (L27)

38L. Emulsion and Alkaline Cleaning. A. J. Holloway. *Finish,* v. 7, Jan. 1950, p. 53-54, 76.
Previously abstracted from *Better Enameling.* See item 7B-214, 1949. (L12)

39L. Electrodeposited Coatings for Metals. Jerome L. Bleiweis. *American Machinist,* v. 94, Jan. 9, 1950, p. 147.

Essential features of "Corronizing" and the "Moly-Black" process. (L14, L17)

40L. Metallizing for Maintenance. *Industry & Welding,* v. 23, Jan. 1950, p. 26-27, 30.

Varied applications. (L23)

41L. Metallizing for Corrosive Prevention. John E. Wakefield. *Iron Age,* v. 165, Jan. 12, 1950, p. 55-60.

Characteristics of Zn and Al sprayed coatings and examples of their use on specific products. A new technique for applying a composite coating that is fused after spraying to give a nonporous coating. (L23, Zn, Al)

42L. Formation of Insulating Oxide Films on Electrical Steel. P. L. Schmidt. *Transactions of the American Institute of Electrical Engineers,* v. 67, Part I, 1948, p. 772-774.

Previously abstracted from condensed version in *Electrical Engineering.* See item 7b-109, 1948. (L14, SG-q)

43L. Metal Cleaning Bibliographical Abstracts. Jay C. Harris. *American Society for Testing Materials,* Special Technical Publication No. 90, 1949, 68 pages.

Includes 494 references with abstracts. (L general)

44L. Investigation of Anodic Oxidation of Aluminum by Means of Electrochemical, Volumetric, and Gravimetric Measurements. (In French.) Leo Cavallaro and Gian Paolo Bolognesi. *Revue de Métallurgie,* v. 46, Oct. 1949, p. 689-694.

Evolution of the physicochemical characteristics of the oxidized layer as a function of time of the treatment was studied for 99.5% aluminum (0.27% Fe, 0.19% Si, 0.020% Ca). Method and conditions of investigation. 10 ref. (L19, Al)

45L. Relation Between Aging of Layers of Paint on Metal and Variation of Electromotive Force. (In French.) Raoul Desalme. *Comptes Rendus* (France), v. 229, Nov. 2, 1949, p. 873-874.

Proposes a new method for determination of the above relation, thus indicating the possibility of evaluation of protective properties of paint by measurement of e.m.f. variation. A schematic drawing shows basic construction of the proposed apparatus. (L26)

46L. The Commercial Production and Use of Precious-Metal Electrodeposits. (In German.) R. Weimer. *Metall,* v. 3, Nov. 1949, p. 376-381.

Methods of production, applications, and limitations of Au, Ag, and Pt electroplated tools and articles. (L17, Au, Ag, Pt)

47L. Bright-Zinc Plating From Alkaline Cyanide Baths. (In German.) Hubert Offermanns. *Metalloberfläche,* v. 1, sec. B, Nov. 1949, p. B121-B123.

Bath compositions and the anodes used. Advantages and a method of further improving the surface of the plated article. (L17, Zn)

48L. Increasing the Corrosion Resistance of Phosphate Films by Subsequent Treatment with Pore-Filling Materials. (In German.) W. Machu. *Archiv für Metallkunde,* v. 3, Oct. 1949, p. 335-340.

Filling the pores of phosphate films on Al and Al alloys with insoluble inorganic compounds reduces the porosity of such films by about 50%. While the addition of inhibitors increases rather than decreases porosity, their use is recommended, since they improve corrosion resistance. Effects of different inorganic compounds were comparatively evaluated. (L14)

49L. Processing Zinc Scrap From Galvanizing Plants. (In German.) E. R. Thews. *Archiv für Metallkunde,* v. 3, Oct. 1949, p. 358-360.

Methods of purifying zinc baths. (L16, A8, Zn)

50L. Steel Dies Inlaid With E Cu ALE. *Welding Journal,* v. 29, Jan. 1950, p. 50.

Dies illustrated are typical examples of the use of "E Cu ALE" electrodes for inlaying draw edges. These electrodes are often used to build up worn die surfaces as well as in the fabrication of new draw dies. (L24, T5, ST)

51L. Automatic Plating Equipment Enables One Operator To Process Thousands of Articles Daily. *Steel,* v. 126, Jan. 16, 1950, p. 87-88.

Equipment and procedures of Westinghouse Electric's new plating division. (L17)

52L. How To Do Bronze-Surfacing. *Linde Tips and Oxy-Acetylene Tips,* v. 29, Jan. 1950, p. 5-7.

Techniques. (L24)

53L. Caloric Stove Corporation Looks Back on Seventy Years in the Stove Business. *Better Enameling,* v. 21, Jan. 1950, p. 8-15.

Forming, pickling, and enameling procedures and equipment. (L27)

54L. Trouble Shootin'. John L. McLaughlin. *Better Enameling,* v. 21, Jan. 1950, p. 37.

Porcelain-enameling defects known as copperheads and scale. (L27)

55L. Design and Use of Burnishing Tools. Herbert C. Lindberg. *Screw Machine Engineering,* v. 11, Jan. 1950, p. 27-29.

Burnishing tools used as attachments on the automatic screw-machine. (L10)

56L. Alloying Process Produces Low-Cost Chromium Case. *Product Engineering,* v. 21, Jan. 1950, p. 146-147.

Both high and low-carbon steels as well as cast iron can be made highly wear, heat, and corrosion resistant by an English process called Chromalloying. The process is similar to conventional pack carburizing and consists of placing parts in a carburizing box containing a Cr-rich powder and heating for approximately 6 hr. (L15, Cr, SG-g)

57L. How Yale & Towne Finishes Materials Handling Machinery. William F. Sorenson. *Products Finishing,* v. 14, Jan. 1950, p. 12-17.

Equipment and procedures. (L general, T5)

58L. Fine Watch Dials Demand Exacting Craftsmanship in Fabrication and Finishing. Theodore R. Schwalm. *Products Finishing,* v. 14, Jan. 1950, p. 20-22, 24, 26, 28, 30.

Pleasing contrast and novel effects are created on watch dials, by a combination of mechanical and chemical finishing processes, one of which is a newly developed black nickel plating process. (L general, T9)

59L. Aluminum; Its Surface Preparation and Finishing. Part III. Paint Finishes. E. R. Yarham. *Products Finishing,* v. 14, Jan. 1950, p. 36, 38, 40, 42, 44, 46.

Includes recommended pre-treatments. (L26, Al)

60L. Amorphous Phosphate Coating for Aluminum Alloys. Allen G. Gray. *Products Finishing,* v. 14, Jan. 1950, p. 60, 62, 66, 68, 70.

Reviews paper by Alfred Douty and F. P. Spruance, Jr., on "Alodine" coating, which resists corrosion and also serves as a base for organic coatings. (L14, Al)

61L. Practical Applications of Modern Products. *Products Finishing,* v. 14, Jan. 1950, p. 82-84, 86.

High Speed Continuous Spray Pickling Machines Process Brass at New Scovill Continuous Strip Mill. Permanent Record of Oven Temperatures Obtained With Traveling-Oven Thermometer. Three Complete Finishing Systems Combined to Speed up Oliver Tractor Production. Plastic Coating Protects Silver Plated Terminals and Armatures. (L general)

62L. Buffing Ferrous and Non-Ferrous Metals. Edward Engel. *Tool Engineer,* v. 24, 1950, p. 37-39.

Selection of buffing wheels, wheel life and lubrication. Specific information for common metals and alloys. (L10)

63L. Field Performance of Modern Asphaltic Pipe Coatings. Gordon N. Scott. *Oil and Gas Journal,* v. 48, Jan. 12, 1950, p. 68, 71, 73, 80.

Results of a number of pipe-line surveys made to determine the effectiveness of the protection against corrosion provided by asphaltic coatings in different locations and after different periods since installation. (L26)

64L. Electrodeposition of Alloys of Phosphorus and Nickel or Cobalt. Abner Brenner, Dwight E. Couch, and Eugenia Kellogg Williams. *Plating,* v. 37, Jan. 1950, p. 36-42.

Co-Ni deposits obtained by chemical reduction and containing phosphorus were harder than ordinary electrodeposits of Ni or Co. This process is uneconomical and attention was directed to electrodeposition of metals with phosphorus. Alloys of Ni or Co containing as much as 15% P were obtained from acid solutions containing phosphites. The deposits are metallic in character and appearance and have good mechanical properties. (To be continued.) (L17, Ni, Co)

65L. Vinyl Coatings for the Metal Decorator. Joseph M. Perrone and Edward R. Lawson. *National Lithographer,* v. 56, Dec. 1949, p. 38-39, 95-96.

Development and properties. (To be continued.) (L26)

66L. The Electro-Colouring of Stainless Steels in Aqueous Solutions. C. E. Naylor. *Plating Notes,* v. 1, Aug. 1949, p. 2-14.

Methods for coloring stainless steels in modified H_2SO_4 solutions were tried. The electrolytic method was found to be superior for production-control purposes. Conditions under which colored films were formed did not correspond with those described by Batcheller; no explanation is known for what appears to be an anomalous effect. (L14, SS)

67L. Highlights of 1949 in Finishing Die Castings. *Die Castings,* v. 8, Jan. 1950, p. 41-42, 44-45.

A review. 16 ref. (L general)

68L. Hard Nickel Plating: Advantages — Applications — Preparation of Base Metal—Formulae. M. H. Orbaugh. *Metal Industry,* v. 75, Dec. 30, 1949, p. 555-556. Condensed from *Metal Finishing.*
(L17, Ni)

69L. Deposition of High-Speed Steel on a Cutting Tool. (In Russian.) I. M. Erofeev. *Stanki i Instrument* (Machine Tools and Equipment), v. 20, Sept. 1949, p. 18-20.
Method applicable to cutting tools of large cross section, reamers, and milling cutters. Deposition is accomplished by use of an oxyacetylene flame with different degrees of reducibility. Optimum dimensions of cutting edge and optimum deposition conditions. (L24, T6)

70L. Portable Apparatus for Applying Hard-Alloy Tips To Cutting Tools. (In Russian.) V. E. Kulchitskovo. *Promyshlennaya Energetika* (Industrial Power), v. 6, Aug. 1949, p. 8-9.
Special feature of the apparatus is the addition of a damping resistance which permits changing the thickness of the built-up layer within wide limits. (L24)

71L. (Book) **Principles of Electroplating and Electroforming. Ed. 3.** William Blum and George B. Hogaboom. 455 pages. 1949. McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y. $6.00.
Principles of electrochemistry and physics that underlie plating processes; developments in the electroplating industry. Verified formulas for all important plating solutions. Recent developments in electrodeposition. Full treatment of each of the commonly used metals, dealt with in the same sequence as in the periodic system. Preparation necessary for deposition on plastics. Deposition of alloys. (L17, L18)

72L. (Book) **The Lea Method of Finishing.** 161 pages. Lea Manufacturing Co., Waterbury 86, Conn. $5.00.
Various metal finishes that may be specified and microphotos of the surface after each finish is applied. Methods of producing a variety of finishes on metals, plastic and woods are discussed. Grinding and buffing wheel composition, grinding compounds, etc. Case histories.
(L general)

73-L. Aluminum Coating of Steel—A Comparison of Various Processes. P. T. Stroup and G. A. Purdy. *Metal Progress,* v. 57, Jan. 1950, p. 59-63, 128, 130.
Steel can be coated with Al by hot dipping, cladding, electroplating, spraying, chemical reaction, and calorizing. Importance of controlling the thickness of the Fe-Al compound that forms between the base metal and the coating. The six methods of coating are compared on the basis of structure and cost. 29 ref.
(L general, ST, Al)

74-L. Elements of Metal Cleaning—for the Fabricator. Adolph Bregman. *Metal Progress,* v. 57, Jan. 1950, p. 75-78.
Complexity of the problem. First of a series. (L general)

75-L. Chlorinated Rubber in the Paint Industry. B. S. Giovani. *Paint Manufacture,* v. 29, Dec. 1949, p. 419-424.
Use of chlorinated rubber paints for noninflammability and resistance to water, water vapor, and various corrosive vapors and liquids. Use for protection of iron and steel structures against fumes. 21 ref.
(L26, Fe)

76-L. Adhesion and Application of Organic Coatings to Metal. B. M. Letsky. *Paint Manufacture,* v. 19, Dec. 1949, p. 425-426, 434.
Investigation of the thermodynamic changes which occur during the wetting of metallic powders and oxides by organic liquids and media. "Adherometer" developed to measure force of adhesion of organic coatings. (L26)

77-L. Uses of Electroplating. *Steel,* v. 126, Jan. 23, 1950, p. 78. Based on paper by W. M. Phillips.
Automotive applications. (L17, T21)

78-L. Hard-Facing Tool Joints. *Oil and Gas Journal,* v. 48, Jan. 19, 1950, p. 77.
Portable unit recently placed in field service for California drilling contractors. (L24)

79-L. Combination Electric Infra-Red and Gas Oven Bakes Paint on Aluminum. William J. Miskella. *Industrial Finishing,* v. 26, Jan. 1950, p. 10-12, 17-18, 20, 22.
Setup developed for cleaning, surface treating, roller coating, baking the finish, and forming aluminum strips into siding of cut lengths, with nail holes punched. (L26, Al)

80-L. Pan Cleaning and Glazing. James F. Nolan. *Industrial Finishing,* v. 26, Jan. 1950, p. 26-28, 30, 33-34.
Equipment and procedures for cleaning and glazing the pans used in bakeries. The glaze is a silicone coating. (L26, T10)

81-L. Ditto Duplicating Machines Finished in Wrinkle Enamel. John P.

Kennedy. *Industrial Finishing*, v. 26, Jan. 1950, p. 38, 40, 42.

Equipment and procedures. Parts are of steel or of die-cast Zn. Includes precleaning. (L26, ST, Zn)

82-L. XLN Magnet Wire Enamel. Robert Lippe and Wallace G. Hope. *Wire and Wire Products*, v. 25, Jan. 1950, p. 40-43, 93.

Linear-polyester wire-coating enamel can be applied without dies in a conventional wire-coating tower. Comparative properties of wire coated with this enamel and with other materials. Typical test results. (L26, Cu)

83-L. Radioactive Tracers Used To Study Plating Process. *Technical News Bulletin*, National Bureau of Standards, v. 34, Jan. 1950, p. 4-5.

Condensed from *Journal of the Electrochemical Society*. See item 23-L, 1950. (L17, S19, Cr)

84-L. Review of 1949 Developments in Organic Finishing. Ferdinand C. Wehrman. *Organic Finishing*, v. 11, Jan. 1950, p. 8, 10-11.

22 references. (L26)

85-L. Production Pickle at Ryan. James R. Langham. *Western Machinery and Steel World*, v. 41, Jan. 1950, p. 82-85, 102.

Development of suitable pickling-bath compositions and production-line system for 18-8 stainless, 19-9-DL, and Inconel. It was necessary to do this with a maximum of five tanks. (L12, SS, Ni)

86-L. A Rapid Method of Determining Sulphuric Acid in Chromium Plating Electrolytes. V. A. Il'in. *Electroplating and Metal Finishing*, v. 3, Dec. 1949, p. 130-131.

Translated from *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, 1948, p. 1389-1390. (L17, S11, Cr)

87-L. Nonferrous Metals Given High Finish by New Chemical Polishing Process. T. C. Du Mond. *Materials & Methods*, v. 31, Jan. 1950, p. 59-61.

New low-cost acid-dip process, developed at Battelle Memorial Institute, which promises to find wide use, especially for polishing intricately shaped parts. Materials successfully polished include Cu, Ni, Al, and alloys. (L12, Cu, Ni, Al)

88-L. Surface Treatment of Diesel Engine Parts. *Journal of the American Society of Naval Engineers*, v. 61, Nov. 1949, p. 887-891. Reprinted from *Motorship*, Oct. 1949.

Methods for treatment of metal surfaces to retard effects of wear. Emphasizes use of phosphate coatings. (L14, CI, ST)

89-L. Metallizing in Relation to Marine Engineering. J. Barrington Stiles. *Journal of the American Society of Naval Engineers*, v. 61, Nov. 1949, p. 923-951. Reprinted from *Transactions of the Institute of Marine Engineers*, v. 60, no. 12, 1948.

The equipment, the process, properties of the different metals which are sprayed, shaft preparation, applications, and associated operations. (L23, T22)

90-L. Continuous Electrolytic Process Makes Tin Plate. *Canadian Metals*, v. 13, Jan. 1950, p. 8-11.

Includes cold rolling, annealing, cleaning and plating. (L17, Sn)

91-L. Reclaiming a Crown Gear. Donn Boring. *Canadian Metals*, v. 13, Jan. 1950, p. 36-37.

Procedure by which a large cast-iron gear with only a few teeth intact was reclaimed by build-up welding and subsequent machining. (L24, CI)

92-L. Alodizing Makes Aluminum Ideal for Chimney Liners. *Modern Metals*, v. 5, Jan. 1950, p. 30-32.

Process for treating Al chimney liners prior to application of resin-base paint. (L14, Al)

93-L. Electroplated Tin-Zinc Alloy Coatings on Iron and Steel Components. E. E. Halls. *Metallurgia*, v. 41, Dec. 1949, p. 68-73.

Details of plating process and results of comparative corrosion tests. Usual compositions are 50-50 and 80-20 Sn-Zn. (L17, Sn, Zn)

94-L. Tin Plate. Part I. A Glance at Hot Dipped and Electrolytic Tin Plate. Part II. Coating of Hot Dipped Tin Plate. John N. Crombie. *American Iron and Steel Institute*, "Technical Committee Activities", 1949, p. 129-171.

The hot-tinning operation and problems involved. 24 ref. (L16, Sn)

95-L. Notes on Nickel Plating From a Fluoborate Bath. E. J. Roehl and W. A. Wesley. *Plating*, v. 37, Feb. 1950, p. 142-146, 171.

Behavior of a nickel fluoborate electrolyte containing excess boric acid indicates that the fluoborate solution is a practical, easily controlled bath for production of sound nickel deposits of moderate stress and high ductility. 11 ref. (L17, Ni)

96-L. Modernizing a Plating Room. *Plating*, v. 37, Feb. 1950, p. 148-152.

Picture story shows improvements achieved by extensive modernization. (L17)

97-L. Electrocoloring of Stainless Steels in Aqueous Solutions. C. E. Naylor. *Plating*, v. 37, Feb. 1950, p. 153-

154, 159-160, 171.

Various methods using modified H_2SO_4 solutions. Results of experiments conducted to determine the best procedure. An electrolytic method was found to be the most satisfactory. (L14, SS)

98-L. Electrodeposition of Alloys of Phosphorus and Nickel or Cobalt. (Concluded.) Abner Brenner, Dwight E. Couch, and Eugenia Kellogg Williams. *Plating,* v. 37, Feb. 1950, p. 161-164.

Results of determination of stresses; chemical attack by HCl and HNO_3, and by salt spray; and microstructure. Possible applications. 10 ref. (L17, Co, Ni)

99-L. Determination of Impurities in Electroplating Solutions. XVII. Traces of Lead in Copper Plating Baths. Earl J. Serfass, W. S. Levine, and Mary H. Perry. *Plating,* v. 37, Feb. 1950, p. 166-170.

After organic material is oxidized with phosphoric acid, the lead is separated from interfering ions by extracting with a CCl_4 solution of dithizone in the presence of KCN. After removal of excess dithizone with alkaline KCN, transmittance of the solution is measured and determined from a calibration curve. (L17, S11)

100-L. Steel Shot Speeds Blast Cleaning; Shot Peening. L. J. Wieschhaus. *Iron Age,* v. 165, Feb. 2, 1950, p. 82-85.

Newly developed cast-steel shot which causes less wear on equipment, lasts longer, and eliminates some pickling. Production methods and comparative resistance to fracture based on service tests. (L10, T5, CI)

101-L. Northrop Develops New Aluminum Primer. K. B. Niles. *Iron Age,* v. 165, Feb. 2, 1950, p. 90-92.

Properties of synthetic-resin primer which gives more corrosion protection for Al and Mg and also improves appearance and furnishes better lacquer base than zinc chromate. (L26, Al, Mg)

102-L. Standard Space Heater Improves Drying Tower. Rod Luttgen and E. M. Tarnoff. *Iron Age,* v. 165, Feb. 2, 1950, p. 93-95.

Use of modified standard unit to dry Zn plating and lacquer finishes on woven-wire fabrics. Productive capacity is increased by 25%. Elimination of tackiness avoids frequent shutdowns to clean rollers. (L general)

103-L. Paint, Plating, and Porcelain Protect and Beautify Display Cases. Ezra A. Blount. *Products Finishing,* v. 14, Feb. 1950, p. 12-18, 20, 22, 24, 26, 30, 32, 34.

How different surface finishes are applied to various component parts which are assembled to produce refrigerators and display cases. (L general)

104-L. A Study of Heat Resisting Finishes. George Black. *Products Finishing,* v. 14, Feb. 1950, p. 38-40, 42.

Comparative investigation of heat-resistant paints under a variety of service conditions. Table shows formulations successfully passing heat tests on metal surfaces up to 950 and 1150° F. (L26)

105-L. Radioactive Tracers Used To Study Plating Process. *Products Finishing,* v. 14, Feb. 1950, p. 42, 44, 46, 48; *Iron Age,* v. 165, Feb. 2, 1950, p. 89.

See abstract of article by Fielding Ogburn and Abner Brenner in *Journal of the Electrochemical Society,* item 23-L, 1950. (L17, S19, Cr)

106-L. Conversion Coatings on Zinc. Vincent Mattacotti. *Products Finishing,* v. 14, Feb. 1950, p. 52-54, 56, 58, 60, 62, 64, 66, 68, 70, 72.

Various methods; results of salt-spray tests. (L general, Zn)

107-L. Recent Developments in Metal Polishing. Allen G. Gray. *Products Finishing,* v. 14, Feb. 1950, p. 74, 76, 78, 80, 82, 84, 86, 88, 90. Based on papers by J. B. Aust and by Wm. A. Corse.

Emphasis on new mechanical polishing equipment. (L10)

108-L. Electroformed Masks for Production Painting. Val Jones. *Production Engineering & Management,* v. 25, Feb. 1950, p. 43-45.

Electroformed masks for painting intricate designs on embossed surfaces at high production rates. Application to the Oldsmobile hubcap. (L18, L26)

109-L. Continuous Zinc Coating Units. H. W. Lynn. *Industrial Heating,* v. 17, Jan. 1950, p. 74-76, 78, 174.

Condensed from paper delivered in 1944 at 22nd meeting of Galvanizers' Committee, American Zinc Institute. (L16, Zn)

110-L. Titanium in Porcelain Enamels. G. H. Spencer-Strong and Robert F. Patrick. *Industrial and Engineering Chemistry,* v. 42, Feb. 1950, p. 253-256.

Development of titanium-opacified enamels and their physical properties. Application directly to the metal without need for a ground-coat. 17 ref. (L27, Ti)

111-L. Preventing Defects in Enameling Holloware. Part XI. Defects in Speckled Ware. F. A. Petersen. *Ceramic Industry,* v. 54, Feb. 1950, p. 45, 49.

Causes and preventive measures. (L27)

112-L. Manufacturing Metallized Picture Tubes. Earl R. Ewald. *Electronics,* v. 23, Feb. 1950, p. 76-79.

Techniques by which the phosphor coating of a television picture-tube screen is covered by a membrane or film on which a thin mirror-like coating of aluminum is evaporated. Membrane is later removed by heat before final evacuation. (L25, Al)

113-L. Silicone Surface Coatings. M. A. Glaser. *Product Engineering,* v. 21, Feb. 1950, p. 109-111.

Specifications, physical and chemical properties, and applications. Effects of elevated temperatures, moisture, and electrical forces on silicone coatings applied to metallic bases. (L26)

114-L. Factors Influencing Oxidation of Iron During Firing of Ground-Coat Enamels. Robert F. Kimpel and Ralph L. Cook. *Journal of the American Ceramic Society,* v. 33, Feb. 1, 1950, p. 57-62.

Oxidation beneath a ground-coat enamel was measured by recording progressive weight change on heating from room temperature to 1550° F. and correcting for volatile constituents. Permeability of the dry, unfired enamel films was correlated with variables characteristic of ground-coat enamel slips (L27, Fe)

115-L. Corrosion Resistance Treatment for Zinc Die Castings. *Iron Age,* v. 165, Feb. 9, 1950, p. 83.

Proprietary chemical treatment which not only increases resistance to surface corrosion, but also serves as a good preparation for enameling. (L14, Zn)

116-L. Abrasive-Belt Finishing. W. A. Papworth. *Machinery* (American), v. 56, Feb. 1950, p. 141-148.

Some applications. (L10)

117-L. Preparing Shafts for Metallizing. John E. Wakefield. *Machinery* (American), v. 56, Feb. 1950, p. 174-177.

Correct preparation of base metal is the most important factor in successful spraying of metal. The surface must be cleaned thoroughly, and must be roughened in such a way that there will be hooks and craters for the molten particles of sprayed metal to key into. Six methods of roughening shafts prior to metallizing. (L23, ST)

118-L. Finishes for Aluminum. *Die Castings,* v. 8, Feb. 1950, p. 45-46, 50.

The range of finishes available for product designer and engineer. (L general, Al)

119-L. Electrodeposition of Chromium-Tungsten Alloy Plates. Donald G. Rogers and Arthur A. Burr. *Journal of the Electrochemical Society,* v. 97, Feb. 1950, p. 67-69.

Alloy plates of Cr and W of thicknesses up to nearly 0.0001 in. were deposited at a temperature of 60-75° C. The plates have excellent appearance and resistance to corrosion by any of the common inorganic acids. (L17, Cr, W)

120-L. A Review of the Electrochemistry of Stressed Metals. M. T. Simnad. *Journal of the Electrochemical Society,* v. 97, Feb. 1950, p. 31C-44C.

Origin and nature of internal stresses; latent energy in deformed metals; influence of stress on electrode potential and corrosion rate; effect of surface preparation on corrosion; stress-corrosion of ferrous and nonferrous metals; corrosion fatigue; and internal stresses in electrodeposited metals. 256 ref. (L17, Q25)

121-L. Silicones in the Protective Coating Industry. John J. Tyner. *Finish,* v. 7, Feb. 1950, p. 30-32, 66.

Use of silicone-resin coatings for protection of metal surfaces against moisture, weathering, high temperatures, and chemicals. Chemistry, properties, and other applications. (L26)

122-L. The Porcelain Enameled Shingle in Residential and Special Purpose Construction. R. B. Schall and K. M. Gibbs. *Enamelist,* v. 26, Winter 1949-50, p. 3-7.

Fabrication, installation, properties, and economic factors. (L27, T26)

123-L. Organic Finishes and Their Application. Ellery G. Harris. *Enamelist,* v. 26, Winter 1949-50, p. 15-18.

Various types of wrinkle, hammer, and other specialty finishes. Application procedures. (L26)

124-L. Control of Electroplating Solutions by Analysis and Observation. XI. Control of Chromium Plating Solutions. K. E. Langford. *Electroplating and Metal Finishing,* v. 3, Jan. 1950, p. 166-168.

Methods for determination of chromic acid and of sulfate ion. (L17, Cr)

125-L. Fume Elimination for Wire Enameling Ovens. R. J. Ruff. *Wire and Wire Products,* v. 25, Feb. 1950, p. 131-132, 172-173.

Various methods and details of the catalytic-incineration procedure and equipment. Operating results. (L26, A7)

126-L. Electroplating and Electropolishing. *Chemical Age,* v. 62, Jan. 14,

1950, p. 83-88.
Reviews 1949 developments.
(L17, L13)

127-L. Mechanism of Electropolishing. T. P. Hoar and J. A. S. Mowat. *Nature,* v. 165, Jan. 14, 1950, p. 64-65.
Studies in the electropolishing of nickel have led to formulation of a hypothesis for its mechanism, which may prove to have general application. (L13, Ni)

128-L. From a Metallurgist's Notebook: Cadmium Plating Defects. H. H. Symonds. *Metal Industry,* v. 76, Jan. 20, 1950, p. 43-44.
Determination of the origin of certain spots on Cd-plated steel shutters. Spotting was caused by accidental application of a corrosive liquid carried in finely divided form in the atmosphere. (L17, Cd)

129-L. A New Wire Enameling Process. H. Martin. *Machinery Lloyd* (Overseas Edition), v. 22, Jan. 7, 1950, p. 83-85.
Kobor process developed in Hungary. The enamel is applied in multiple-layer formation, each layer being heated and set previous to the application of the next one. The method is applicable primarily to small copper conductors. (L26, Cu)

130-L. Influence of Concentration of Electrolyte on the Production of Ultraviolet Radiation During Anodic Oxidation of Aluminum. (In French.) R. Domansky. *Collection of Czechoslovak Chemical Communications,* v. 14, nos. 8-10, 1949, p. 441-444.
Experimental data which show that the intensity of ultraviolet radiation diminishes with concentration of certain common acidic and basic electrolytes and at a definite concentration ceases to be detectable. It is believed that this phenomenon is the cause of the formation of nonconducting layers in very dilute solutions. (L19, Al)

131-L. Nickel and Chromium Plating Compared. Jerome L. Bleiweis. *Metal Progress,* v. 57, Feb. 1950, p. 200-202.
Surveys the two processes, their properties, and applications.
(L17, Ni, Cr)

132-L. Self Regulating Solution Speeds Chromium Plating. William Czygan. *Iron Age,* v. 165, Feb. 16, 1950, p. 91-93.
Increases of 30-50% in cathode efficiency, permitting shorter plating time or thicker deposits in the same plating times, are reported by shops using Unichrome SRHS solution. The bath is automatically self-regulating, eliminating the need for chemical analysis. Other advantages include better covering power and less sensitivity to current interruptions.
(L17, Cr)

133-L. Protective Coatings for Weathered Galvanized Sheets. M. L. Burgener and Deane G. Carter. *Agricultural Engineering,* v. 31, Feb. 1950, p. 67-70.
Experimental test program conducted by American Zinc Institute since 1932, using a wide variety of paints and metal-pigment coatings.
(L26, Zn)

134-L. Electrically Operated Hot Vapor Degreaser Solves a Cleaning Problem. *INCO Magazine,* v. 23, Winter 1950, p. 13, 28.
Ni-clad degreaser which can handle 3000 lb. of metal parts per hour. Flexibility makes it useful for items of many different sizes. (L12, Ni)

135-L. The Painting, Enamelling and Lacquering of Light Metals. *Light Metals,* v. 13, Jan. 1950, p. 32-37; Feb. 1950, p. 84-92.
Requirements and procedures for application of coatings to Al, Mg and their alloys. Jan. issue: The difference between light alloys and the heavy nonferrous metals and steel with respect to painted coatings and cleaning procedures. Feb. issue: Chemical and electrochemical pretreatments, and priming and finishing paints for Al and Mg.
(L26, Al, Mg)

136-L. Elimination of Paint Peeling. Jerome L. Bleiweis. *Organic Finishing,* v. 11, Feb. 1950, p. 9-13.
Case history relating to the elimination of paint peeling on Al-base alloys in an aircraft plant. Investigation of causes and methods adopted to alleviate the problem. (L26, Al)

137-L. Surface Preparation for Paint Finishing. S. Markay. *Organic Finishing,* v. 11, Feb. 1950, p. 18-19.
Equipment and procedures of White Motor Co. (L26, ST)

138-L. Revamped Production Facilities Boost Pipe Galvanizing 30%. Dan Reebel. *Steel,* v. 126, Feb. 20, 1950, p. 84-86.
Novel handling arrangement, which utilizes four permanently magnetic carrier rolls set in tandem for double drag-out of pipe from the galvanizing pot. Large savings in Zn consumption are claimed. (L15, Zn, ST)

139-L. Pulsed Current Electroplating; Some New Developments in the Application of Alternating Current to the Plating and Smoothing of Deposits. *Electroplating and Metal Finishing,* v. 3, Jan. 1950, p. 171-174.
Gives general principles and spe-

cific examples, including bath composition, electrical conditions, times, and temperatures. (To be continued.) (L17)

140-L. Modern Developments in Metal Finishing. Recent Developments in Electrodeposition Processes. Recent Developments in Plant for Electrodeposition. E. A. Ollard. **Phosphate Treatments for Iron and Steel Surfaces.** H. A. Holden. *Electroplating and Metal Finishing,* v. 3, Feb. 1950, p. 208-211, 213-214.

First three of a series of 8 lectures. (To be continued.) (L17, L14)

141-L. Economical Degreasing With Emulsifiable Solvent Cleaners. *Electroplating and Metal Finishing,* v. 3, Feb. 1950, p. 215-216.

Emphasis on products made by a British firm. (L12)

142-L. Surface Treatment and Finishing of Light Metals. Part 5. (Continued.) S. Wernick and R. Pinner. *Sheet Metal Industries,* v. 27, Jan. 1950, p. 71-81.

Chemical conversion coatings for aluminum and its alloys, history of chemical oxide coatings, theory of chemical oxidation, and the proprietary processes known as "M. B. V." and "E. W.". 26 ref. (To be continued.) (L14, Al)

143-L. Vinyl Coatings for the Metal Decorator. Joseph M. Perrone and Edward R. Lawson. *National Lithographer,* v. 57, Jan. 1950, p. 32-33, 60-61.

History and development. (To be concluded.) (L26)

144-L. Barrel Tumbling of Parts Prior to Finishing. Edward Engel. *Tool Engineer,* v. 24, Feb. 1950, p. 40-42. (L 10)

145-L. Deep-Drawing Galvanized Steel Retains Corrosion Resistance After Forming. Kenneth Rose. *Materials & Methods,* v. 31, Feb. 1950, p. 63-64.

Method of cleaning and applying a special Zn coating to flat steel strip which has made practical the use of galvanized stock for deep-drawn parts. (L16, Zn)

146-L. Porcelain Enamels. H. R. Clauser. *Materials & Methods,* v. 31, Feb. 1950, p. 71-82.

What porcelain enamels are and what they can and cannot do. Introduction; characteristics of porcelain enamels; types of porcelain enamels; and metals for porcelain enameling. (L27)

147-L. Trend to Intermediately Fired Porcelain Enamels. John L. McLaughlin. *Better Enameling,* v. 21, Feb. 1950, p. 6-7, 22-23.

Advantages of 1450° F. titanium enamels. Weight of application vs. reflectance curves for 1450° Ti and 1520° Zr enamels are presented and discussed. (L27)

148-L. Trouble Shootin'. John L. McLaughlin. *Better Enameling,* v. 21, Feb. 1950, p. 36.

Porcelain-enamel defect known as "poppers". (L27)

149-L. Throwing Power; Open Discussion at E.T.S. Meeting. *Metal Industry,* v. 76, Jan. 13, 1950, p. 28-29; Jan. 27, 1950, p. 65-67.

Discussion at recent London meeting of Electrodepositors' Technical Society. (L17)

150-L. From a Metallurgist's Notebook: Flaking of Enamel. H. H. Symonds. *Metal Industry,* v. 76, Jan. 27, 1950, p. 63-64.

Trouble was encountered with enameled cast-brass letters on account of exfoliation. Results of metallurgical examination indicate that the trouble was caused by surface oxide and corrosion products destroying the adhesion. Various suggestions to prevent further occurrence of the difficulty. (L26, Cu)

151-L. De-Enamelling. Bernard B. Kent. *Foundry Trade Journal,* v. 88, Feb. 2, 1950, p. 123-126.

Various methods available and their advantages and disadvantages in the light of personal experience with vitreous enameling. (L27)

152-L. Metal Cleaning: Bibliographic Abstracts. Jay C. Harris, Ed. 68 pages. Special Technical Publication No. 90, American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $2.00 to A.S.T.M. members; $2.75 to nonmembers.

A convenient manual of 494 abstract references on metal cleaning, including patents. The articles are arranged first by year, and then by author, or where anonymous, by journal. With one earlier exception, the references start with 1922. Where possible, original articles have been abstracted; others are reprinted from other abstract journals. Accompanied by complete author, subject and patent indexes.—E.C.S. (L10, L12, L13)

153-L. Ceramics at the Bureau of Standards. II. *American Ceramic Society Bulletin,* v. 29, Feb. 1950, p. 72-75.

Activities and facilities of the refractories and enameled metals sections. (L27)

154-L. Vinyl Coatings for the Metal Decorator, Part Three. (Concluded.) Joseph M. Perrone and Edward R. Lawson. *National Lithographer,* v. 57, Feb. 1950, p. 46-47, 71, 73.

Properties and performance of Vi-

nylite resin VAGH, including effects of various modifiers. (L26)

155-L. Steel Grit Cleaning Department. Robert C. Sherwood. *Western Metals,* v. 8, Feb. 1950, p. 27-29.

Respective advantages of sand and steel grit for a specific job. (L10, ST)

156-L. Infrared Degreasing and Paint Baking. Paul H. Krupp. *Industrial Finishing,* v. 26, Feb. 1950, p. 20, 23-24, 26, 28.

Procedures and applications. (L12, L26)

157-L. Production Lithographing of Metal Products. Ray W. Fultz. *Industrial Finishing,* v. 26, Feb. 1950, p. 54-56, 58, 60, 62.

Mass-production of lithographed signs. Black plate of can-making quality is printed in seven colors on a special press. (L26)

158-L. A Method for the Electrolytic Polishing and Etching of Some Al-Ag Alloys, Commercial Purity Aluminum and Pure Magnesium. L. W. Larke and E. B. Wicks. *Metallurgia,* v. 41, Jan. 1950, p. 172-174.

Details of procedure. Same solution is used for the Al-rich Al-Ag alloys, Al, and Mg. (L13, Al, Mg)

159-L. Electrolytic Polishing of Metals by Means of an Alternating Current. (In Japanese.) Tadao Fukuroi. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, May 1949, p. 10-11.

Suitable for Ni, Fe, steel, Al, W, Zn, Sn, Cu, brass, and Mo. Apparatus and data. (L13)

160-L. Research on Cu Plating To Prevent Carburization. (In Japanese.) Tadayoshi Ifnui. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, May 1949, p. 12-15.

The acid solution was found to be unsuitable but an alkaline solution containing 33 g. CuCN, 38 g. NaCN, 14 g. Na_2CO_3, and 0.3 g. $Na_2S_2O_3$ per liter of H_2O was found to be satisfactory. A minimum of 0.008 mm. plating thickness is necessary to prevent carburization of carbon and Ni-Cr-W steels. (L17, J28, CN, AY)

161-L. The Cementation of Boron on Iron and Steel by Electrolysis of Fused Borax. (In Japanese.) Masuo Kawakami and Noboru Komuro. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Aug. 1949, p. 15-19.

Experimental study of the process. Cementation occurred at temperatures as low as 800° C. Above 900° C., it increased exponentially with temperature. For 0.15% C steel, at 900° C. and 10 amp. per sq.dm. for 2 hr., thickness of layer was about 0.1 mm. and hardness approximately 1200 Vickers. W, Mo, or V retarded the process and C, Ti, Si, and W increased hardness of the layer. (L15, B, Fe)

162-L. Electrodeposition of Alloys. (In Japanese.) Masuo Kawakami and Mayumi Someno. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Aug. 1949, p. 19-21.

Fe-Ni alloys were obtained by electrolysis from a solution containing sulfates of the two metals and ammonium sulfate. Relations between compositions of solutions, temperatures, current densities, duration of electrolysis, and compositions of electrodeposited alloys were investigated. The deposits contained approximately 18% Ni. (L17)

163-L. How To Work Clad Materials. Wm. M. Stocker, Jr. *American Machinist,* v. 94, Feb. 6, 1950, p. 89-104.

Special report tells how clad metals are made and covers handling; cutting; welding; machining; hot working; shearing and punching; bending and rolling; drawing; spinning; heat treatment; finishing; and nondestructive testing. (L22)

164-L. Ford Production of Rear Axle Housings Highly Mechanized. *Industrial Heating,* v. 17, Feb. 1950, p. 216-220, 222, 224, 226, 228, 230, 351-352, 354, 356.

A series of cleaning, annealing, forming, and welding operations. (A4, T21)

165-L. Finishing of Truck Light Components at Columbus Metal Products, Inc. *Industrial Heating,* v. 17, Feb. 1950, p. 293-294, 296, 298. (L general)

166-L. Electrical Measurements. on Metal Protective Paints. W. E. Shaw and D. L. Hawke. *Finish,* v. 7, Mar. 1950, p. 26-29, 73.

Previously abstracted from *Organic Finishing.* See item 7A-180, 1949. (L26)

167-L. Preventing Defects in Enamelling Holloware. (Conclusion.) **Grayware Defects.** F. A. Petersen. *Ceramic Industry,* v. 54, Mar. 1950, p. 55-56.

Several types of defects; causes and remedies. (L27)

168-L. Theory of Rate Processes as a Means of Studying Plating Reactions. Donald G. Rogers and Arthur A. Burr. *Journal of the Electrochemical Society,* v. 97, Mar. 1950, p. 92-98.

Suggestions based on equations adapted from the literature are made for a method of study of plating cells where current efficiency is less than 100%. Procedure involving current-voltage curves. Data for the plating of Cr from chromic acid show applicability of the equations and indicate the possibility of this method of study for irreversible cells. Effect of sulfate ratio was studied. (L17, Cr)

169-L. Antimony Plating. K. Gustaf Soderberg and H. L. Pinkerton. *Plating,* v. 37, Mar. 1950, p. 254-259.

Production of dull to brilliant Sb deposits on Cu or steel of any desired thickness from complex citrate baths. Ductility and luster. 15 ref. (L17, Sb)

170-L. Chromium Plating Large Stainless Steel Welded Assemblies. *Plating,* v. 37, Mar. 1950, p. 260-264.

Procedure used by Briggs Manufacturing Co., Detroit. (L17, Cr, SS)

171-L. Pickling and Pickling Inhibition. Alfred Douty. *Plating,* v. 37, Mar. 1950, p. 269-271.

Recent developments in the field of oxide and scale removal, with special attention to inhibitors in acid pickling solutions. Hydrogen embrittlement and blistering as affected by inhibitors. Emphasis is on pickling of steels. 15 ref. (L12, ST)

172-L. A Technical Information File for the Plater and Metal Finisher. William P. Foley. *Plating,* v. 37, Mar. 1950, p. 276-277.

Proposes a filing system for the literature in the field. (L general)

173-L. Power Brushing Speeds Bumper Production. *Iron Age,* v. 165, Mar. 9, 1950, p. 78.

(L10, CN)

174-L. Practical Plating Problems; Open Discussion by E. T. S. Midlands Centre. *Metal Industry,* v. 76, Feb. 10, 1950, p. 106-108.

(L17)

175-L. Anodizing: Electrolytes—Film Formation—Electropolishing. D. H. Napier and J. V. Westwood. *Metal Industry,* v. 76, Feb. 17, 1950, p. 123-126.

Need for a more scientific approach to the anodic processing of aluminum. Reviews the literature and discusses theories. 22 ref. (L19, Al)

176-L. Soft Grit Blasting; A Recent Development for Cleaning Metals. *Automobile Engineer,* v. 40, Feb. 1950, p. 75-76.

(L10)

177-L. The Bullard-Dunn Electrolytic Descaling and Tinplating Process. *Wire Industry,* v. 17, Feb. 1950, p. 115. Reprinted from *Tin and Its Uses,* Oct. 1949.

Unique feature of the process described is that the descaling bath, consisting of dilute H_2SO_4, uses a tin salt as an inhibitor. (L13, L17, Sn)

178-L. A Contributor Discusses Inhibitor Practice. *Wire Industry,* v. 17, Feb. 1950, p. 165.

Action of chemical corrosion inhibitors as applied to pickling of steel, especially in the form of wire. (L12, ST)

179-L. The Electrodeposition of Tungsten. F. W. Salt. *Murex Limited Review,* v. 1, no. 5, 1949, p. 77-87.

Critically reviews previous work. 19 ref. (L17, W)

180-L. Practical Application of the Metal-Spraying Process. (In German.) (Concluded.) H. Reininger. *Metalloberfläche,* sec. A, v. 3, Sept. 1949, p. 173-176; Oct. 1949, p. 191-195; Nov. 1949, p. 207-211; Dec. 1949, p. 220-223.

Compares the corrosion-protective and heat resistant properties of steels spray-coated by English, German, and French methods; and the heat resistant properties of steels Al-coated by different methods. Oct.: Application to surfacing of dies for molding of rubber and plastic articles, also for production of artistic objects. Nov.: Production of bearings and use of metal spraying for making repairs. Dec.: Repair and hard-surfacing methods, also several special applications. 161 ref. (L23)

181-L. Concerning the Production of Thin Sheets Especially for Enameling. (In German.) Erich Schauff. *Metalloberfläche,* sec. A, v. 4, Jan. 1950, p. 10-13.

Types of steels suitable for the rolling of thin sheets, treatment of the rolled sheets, and special problems in the enameling of thin sheets. Recent advances made in production and treatment. (L27, F23, ST)

182-L. Pickling and Pickling Acids. (In German.) W. Savelsberg. *Metalloberfläche,* sec. B, v. 2, Jan. 1950, p. 12.

Pickling with H_2SO_4 prior to galvanizing is frequently unsatisfactory; recommends the use of a 10% solution of HCl, possibly plus 5% $FeCl_3$. (L12, ST)

183-L. A New Method for Protecting of Metals in Electrolytes Against Corrosion by Coating With Monomolecular Films of a Nobler Metal. (In German.) O. Erbacher, W. Herr, M. Ebert, and H. v. Babo. *Archiv für Metallkunde,* v. 3, Dec. 1949, p. 409-413.

Experiments on electrodeposition of Bi on Ni, Cu on Zn, and Cu on Fe show that a monomolecular film of a nobler metal is an effective protection for electrodes. The optimum

thickness of the layer is indicated by the equilibrium between the electrochemical deposition of the nobler metal and its resolution in the electrolyte. Coating of Fe with Cu was found to be an excellent protection against its corrosion. 14 ref. (L17, Zn, Fe, Ni)

184-L. Defective Galvanic Coatings, Their Causes and Methods of Correction. (In German.) E. R. Thews. *Archiv für Metallkunde,* v. 3, Dec. 1949, p. 432-436.

The different defects, their causes, and corrective measures for articles plated with Ni, Cu, brass, and Cd. (L17, Ni, Cu, Cd)

185-L. Weld Hard Surfacing of Water Turbines. (In German.) A. Schmidt and H. Fauland. *Schweisstechnik,* v. 3, Nov. 1949, p. 121-128.

Repair of worn or corroded water turbines. Compositions of two types of welding rods; strength properties of welded parts. (L24, ST)

186-L. Concerning the Growth of Electrolytically Produced Porous Aluminum Oxide Films. (In German.) Heinz Wilsdorf. *Zeitschrift für angewandte Physik,* v. 2, Jan. 1950, p. 17-20.

The outer and inner-surfaces of the films were examined under the electron microscope. Micrographs and tabulated data show the effects of acid and time on structure. (L19, Al)

187-L. Weld Hard Surfacing With Deloro-Stellite Hard Metal. (In German.) W. Brandenburger. *Zeitschrift für Schweisstechnik; Journal de la Soudure,* v. 40, Jan. 1950, p. 11-18.

"Deloro-Stellite" is described as a metal with high heat, corrosion, and wear resistant properties. The welding method used. (L24)

188-L. Electrodeposition of Alloys of Phosphorus With Nickel or Cobalt. Abner Brenner, Dwight E. Couch, and Eugenia Kellogg Williams. *Journal of Research of the National Bureau of Standards,* v. 44, Jan. 1950, p. 109-122.

Previously abstracted from *Plating,* v. 37, Jan. 1950, p. 36-42; Feb. 1950, p. 161-164. See item 98-L, 1950. (L17, Co, Ni)

189-L. Production Clinic for Finishing Die Castings. *Die Castings,* v. 8, Mar. 1950, p. 41-44.

Modern control methods for bright-nickel baths and chromate coatings for Mg. 12 ref. (L17, L14, Ni, Mg)

190-L. Barrel Chrome Plating Small Die Cast Parts Cuts Finishing Costs. E. F. Berry. *Die Castings,* v. 8, Mar. 1950, p. 45-46, 69-70.

As applied to zinc. (L17, Cr, Zn)

191-L. Kaiser—New Name in Porcelain Enameling. *Better Enameling,* v. 21, Mar. 1950, p. 8-15.

Equipment and procedures of Kaiser Metal Products, Bristol, Pa., now producing sinks and bathtubs. (L27, CN)

192-L. Trouble Shootin'. John L. McLaughlin. *Better Enameling,* v. 21, Mar. 1950, p. 33.

The following porcelain-enameling defects, their causes and remedies: Handling scars, point marks, stone marks, and dusting. (L27)

193-L. Hardfacing Applications in the Steel Industry. J. J. Barry. *Welding Journal,* v. 29, Mar. 1950, p. 198-203.

Types of hard facing alloys, service conditions, applications, techniques and methods, and economics. (L24, ST, SG-m)

194-L. Portable Automatic Hard-Facing of Drill Pipe Tool Joints. J. G. Watson, Jr., and H. N. Keener. *World Oil,* v. 130, Mar. 1950, p. 94-95. (L24, ST, SG-j)

195-L. Non-Metallic Lining Materials for Process Vessels in the Pulp and Paper Industry. Beaumont Thomas. *Corrosion,* v. 6, Mar. 1950, p. 82-88; discussion, p. 88.

Ceramic and inorganic lining materials. 27 ref. (L26, L27, T29)

196-L. Some Observations on Reactions of Enamel and Iron. Grant E. Miller and B. J. Sweo. *Journal of the American Ceramic Society,* v. 33, Mar. 1, 1950, p. 107-110.

Gas evolution was observed during heating of mixtures of powdered iron and finely divided enamel frits. Specific gravity of the resulting mass was taken as an index of degree of gas evolution. Data were obtained as a function of time of heating, temperature employed, material addition, and type of frit. Tests with Cu, Ni, Cr, and Mn were also conducted. 16 ref. (L27, Fe, Cu, Ni, Cr, Mn)

197-L. How Chrome-Plated Piston Rings Are Made. *SAE Journal,* v. 58, Mar. 1950, p. 67-68. Based on "Chrome-Plated Piston Rings—Design and Application", by Arthur M. Brenneke.

Procedures used by Perfect Circle Corp. (L17, T21, Cr)

198-L. Metal Finishing Developments of 1949. Adolph Bregman. *Iron Age,* v. 165, Mar. 16, 1950, p. 76-81.

Economic and technological developments, including chemical polishing, waste disposal, nonmetallic finishing, etc. (L general)

199-L. Equipment Corrosion Seen Curbed by New "Poly" Spraying Technic. W. B. DeLong. *Food Industries,*

v. 22, Mar. 1950, p. 82-83, 181-182.

Use of flame-sprayed polyethylene coatings for prevention of corrosion of food and chemical processing equipment. (L26, T29)

200-L. Well-Planned Cleaning, Spray Painting, and Baking Setup Produces High-Quality Kitchen Cabinets. Ezra A. Blount. *Products Finishing,* v. 14, Mar. 1950, p. 14-23.

Equipment and procedures. (L26)

201-L. New Seal Primer for Aircraft Finishing. Gilbert C. Close. *Products Finishing,* v. 14, Mar. 1950, p. 44-45, 48, 50, 52.

See abstract of "Priming Coat for Light Metals", *Light Metal Age,* item 6-L, 1950. (L14, Al, Mg)

202-L. Infra-Red Accomplishes Degreasing and Paint Baking on Single Conveyor. *Products Finishing,* v. 14, Mar. 1950, p. 82-86.
(L26)

203-L. A Report on Recent Research in Electrolytic Polishing. (Continued.) P. Michel. *Sheet Metal Industries,* v. 27, Feb. 1950, p. 165-173.

Methods for study of the microstructure of electropolished surfaces; and for measurement of their physical and mechanical properties, and corrosion resistance. General conclusions; present and potential applications. (L13)

204-L. The Production of Geometrically Accurate Shapes by Electrolytic Polishing. P. Michel. *Sheet Metal Industries,* v. 27, Mar. 1950, p. 267-271.

Causes of irregular polishing, design of anode and cathode assemblies, and effects of electropolishing on coefficient of friction and fatigue limit. Experiments on a component of simple geometrical form (a piston pin). (L13, ST)

205-L. Electroplating Jigs; Some Considerations of the Use of Permanent Magnets. A. H. E. Barrow. *Metal Industry,* v. 76, Feb. 24, 1950, p. 147-148.

Some ways in which permanent magnets can be utilized in electroplating jigs. (L17, T5, SG-n)

206-L. Batch Production Bright Nickel and Chrome Plating. R. Wall. *Journal of the Electrodepositors' Technical Society,* v. 25, 1950, p. 23-38. (Preprint.)

Workshop experiences, production methods, resulting finish, production costs, advantages, and disadvantages of one company's process.
(L17, Ni, Cr)

207-L. Mechanism of Electrolyte Oxidation and of Formation of Aluminum Oxide Layers. (In French.) Joseph Patrie. *Revue de l'Aluminium,* v. 26, Dec. 1949, p. 397-403.

Mechanism of formation of the layer; experimental method for study of the phenomenon; and results of a study of two cases: Formation of a very compact and highly insulating oxide layer; and formation of more or less porous layers of considerable thickness. (To be continued.)
(L19, Al)

208-L. Protection of Metals by Diffusion of Chromium. (In French.) Philippe Galmiche. *Comptes Rendus* (France), v. 230, Jan. 2, 1950, p. 89-91.

Method by which, in a single operation, smooth bright coatings are obtained, also alloy coatings of Cr plus elements such as Al, Si, or Zr.
(L15, Cr)

209-L. Electrical Resistance and Optimum Composition for Electropolishing Baths. (In French.) Eugène Darmois, Israël Epelboin, and Djafar Amine. *Comptes Rendus* (France), v. 230, Jan. 23, 1950, p. 386-388.

Method for study of optimum bath conditions by determination of electrical resistance of the solutions simultaneously with maximum resistance of the anodic layer. (L13)

210-L. Influencing the Electrical Deposition of Metals by Means of Cathodes Vibrating at Different Frequencies, Especially in the Range of Ultrasonic Frequencies. (In German.) Fr. Müller and H. Kuss. *Helvetica Chimica Acta,* v. 33, Feb. 1, 1950, p. 217-228.

Surveys literature on the above. Experiments on Cu, Ni, and Cr electrodeposits show that the method improves the adhesiveness, hardness, and tensile strength of the metal deposits and increases the current yield. (L17, Cu, Ni, Cr)

211-L. Mechanized Finishing Gives Tractors Show-Room Gloss. A. A. Stiehl. *American Machinist,* v. 94, Mar. 20, 1950, p. 93-95.

Highly modernized cleaning, painting and baking system. (L26, T21)

212-L. Automatic Spray Painting of Bake Finish on Metal Wall Tile. E. J. Ryser. *Industrial Finishing,* v. 26, Mar. 1950, p. 28-30, 32.

Equipment and procedures. The base consists of Zn-plated steel.
(L26, CN, ZN)

213-L. Painting Coil Springs in Centrifugal Machines. Dan Chieger. *Industrial Finishing,* v. 26, Mar. 1950, p. 36-38, 41-42.
(L26, T7)

214-L. Finishing Metal Caskets. L. A. Fletcher. *Industrial Finishing,* v. 26, Mar. 1950, p. 46, 48, 50, 52.
(L general)

215-L. Laying Dutch Metal Leaf on Picture Frame Mouldings. *Industrial Finishing,* v. 26, Mar. 1950, p. 78-80, 83-84.
Highly-skilled technique. "Dutch metal" is an alloy that has the appearance of deep gold. It is hammered or rolled thin to make metal leaf, but it cannot be made as thin as genuine gold. It tarnishes or discolors if exposed to the air; therefore, it must be protected with clear finishing material. (L general)

216-L. Metal Cleaning Problems and Tests for Cleaners. Adolph Bregman. *Metal Progress,* v. 57, Mar. 1950, p. 339-340, 394, 398, 400, 402, 404, 406.
Some cleaning methods and numerous tests used for evaluating the effectiveness of cleaners. (L12)

217-L. Metallizing by High Vacuum. Marvin Schneider. *Modern Plastics,* v. 27, Apr. 1950, p. 135, 138-140.
Various equipment and procedures for applying metal coatings to plastic products. Includes vacuum metallization; silver reduction; and electroplating. (L25)

218-L. Pulsed Current Electroplating: Some New Developments in the Application of Alternating Current to the Plating and Smoothing of Deposits. (Continued.) *Electroplating and Metal Finishing,* v. 3, Mar. 1950, p. 241-243.
Reviews journal literature and patents. (L17)

219-L. Phosphate Treatments for Iron and Steel Surfaces. (Continued.) H. A. Holden. *Electroplating and Metal Finishing,* v. 3, Mar. 1950, p. 244-245, 248.
Concludes survey. (L14, CI, ST)

220-L. Methods for the Protection and Decoration of Aluminium. V. F. Henley. *Electroplating and Metal Finishing,* v. 3, Mar. 1950, p. 248-252.
A survey. (L general, Al)

221-L. Measuring Minute Surface Film. J. G. Donelson. *Modern Packaging,* v. 23, Mar. 1950, p. 125-126.
"Hydrophil Balance" used by U. S. Steel for a quick check of distribution of oil film on tinplate.
(L17, CN, Sn)

222-L. Corrosion Protection by Metallizing. John Wakefield. *Gas Age,* v. 105, Mar. 16, 1950, p. 33-35, 74, 76, 78, 80.
Application of sprayed metal to pipe lines, holders, and compressors. (L23, ST)

223-L. Recent Developments in Heat and Corrosion Resistant Coatings for Tools. Edmund B. Neil. *Tool Engineer,* v. 24, Mar. 1950, p. 34-36.
Hard surfacing, chemical treatments, corrosion resistant and bright deposits, ceramic coatings, and organic coatings. (L general, T6)

224-L. Polishing and Cleaning Metals Prior to Finishing. Edward Engel. *Tool Engineer,* v. 24, Mar. 1950, p. 43-47.
The restrictions and advantages of electropolishing. Metal cleaning and passivation of a number of metals. (L13, L12)

225-L. Hardfacing vs. Abrasion. M. Riddihough. *Welding,* v. 18, Mar. 1950, p. 109-111.
Effect of abrasion upon hard faced earthmoving equipment with emphasis upon the need for selecting different alloys for work on different soils. Methods of deposition of hard metal. (L24, Q9, T4, SG-m)

226-L. When and How To Line Process Vessels With Stainless Steel. R. G. Sloan, Jr. *Chemical Engineering,* v. 57, Mar. 1950, p. 117-121.
When is stainless lining cheaper than stainless-clad or solid stainless? What welding method gives best results for its money? What are the pros and cons of each technique? Answers to these and other key questions on lining with stainless. (L22, K general, T29, SS)

227-L. Metallizing Method of Holder Protection Used at Long Beach, Calif. Arthur Rohman. *American Gas Journal,* v. 172, Mar. 1950, p. 17-18, 46.
Use of sprayed zinc. (L23, CN, ZN)

228-L. Methods of Plating Zinc-Base Die Castings. Robert L. Buckley. *Materials & Methods,* v. 31, Mar. 1950, p. 53-55.
Design, careful surface preparation, and proper choice of plating cycle are all important considerations for successful plating of Ni or Cr on the above. (L17, Zn, Ni, Cr)

229-L. Hard Chromium; Methods of Plating on Aluminium and Its Alloys. K. Gebauer. *Metal Industry,* v. 76, Mar. 10, 1950, p. 186-188.
Previously abstracted from *Archiv für Metallkunde.* See item 8-165, 1949. (L17, Cr, Al)

230-L. Gas-Appliance Users' Demands From the Enameller; Quality Requirements of the Ultimate Customer. E. W. B. Dunning. *Foundry Trade Journal,* v. 88, Mar. 2, 1950, p. 231-237.
Various types of enameling defects,

their causes, and remedies. Test procedures. (L27)

231-L. The Painting of Structural Steelwork. *Engineering,* v. 169, Mar. 3, 1950, p. 256.

Results of comprehensive British cooperative investigation conducted since 1945. (L26, T26, CN)

232-L. New Type of Enameling Furnace for Suspended Firing and Vertical Charging Methods. (In German.) W. Kuttler. *Metalloberfläche,* sec. A, v. 4, Feb. 1950, p. 18-21.

Design and operation. Advantages of increased output, and decreased operating cost, repair, and maintenance are claimed. (L27)

233-L. The Value of Clad Metals. (In German.) Werner Engelhardt. *Metalloberfläche,* sec. A, v. 4, Feb. 1950, p. 23-24.

The various commercial uses and respective advantages of clad metals as well as different processes of producing them by adhesion, welding, vapor-deposition, dipping, etc. (L22)

234-L. Avoiding Failures in the Metal Spraying Process. (In German.) H. Reininger. *Metalloberfläche,* sec. B, v. 2, Feb. 1950, p. 22-24.

Recommendations. (L23)

235-L. Effects of Defective Painting on Corrosion Protection. (In German.) K. Würth. *Werkstoffe und Korrosion,* v. 1, Jan. 1950, p. 20-26.

Importance and principles of good painting, and the various types and causes of defective coats of paint. The importance of considering the water and gas permeability of paints and their resistance to external influences. (L26)

236-L. Cleaning Metal Surfaces. (In German.) G. Schultze. *Werkstoffe und Korrosion,* v. 1, Jan. 1950, p. 26-33.

Different cleaning methods. Effectiveness of different inhibitors in preventing corrosion of metals by various media at different temperatures. (L12, R10)

237-L. Properties of the Hard Metals and Their Influence on Production and Use of Tools. (In German.) J. Hinnüber. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, Feb. 11, 1950, p. 111-117.

Structures and properties of sintered hard metals, means of application, avoidance of stress cracks, behavior on grinding, etc. 19 ref. (SG-m, EG-d, W, Ti)

238-L. Weld Hard Facing of Tools With Hard Manganese Steel. (In German.) W. Hummitzsch and A. Schmidt. *Schweisstechnik,* v. 4, Jan. 1950, p. 9-11.

Deposition of hard Mn and Cr steels on jaw crushers, hammer mills, and cone crushers by means of arc welding. (L24, T6, AY)

239-L. Hydrogen Embrittlement in Cadmium and Zinc Electroplating. C. A. Zapffe and M. E. Haslem. *Plating,* v. 37, Apr. 1950, p. 366-371.

Embrittlement through hydrogen absorption by the cathode is measured in terms of bend angle sustained by plated wires before fracturing. Both mild steel and stainless steel were studied. Results provide a basis for predicting the scope of the hydrogen problem that might be encountered on changing from one plating operation to another, as well as a quantitative measure of hydrogen injury caused by each of the baths studied. (L17, Q23, Cd, Zn, CN, SS)

240-L. Adherent Electrodeposits of Nickel on Thin Films of High-Chromium Alloys. Lorn L. Howard. *Plating,* v. 37, Apr. 1950, p. 373-374, 383.

Reviews literature and gives details of procedure developed for depositing Ni on thin films of Cr alloys containing approximately 90% Cr. Such films have certain specialized applications, for instance on piezoelectric quartz plates, to provide suitable mechanical coupling to various sound-transmitting media. 27 ref. (L17, Ni, Cr)

241-L. Some Modern Methods of Surface Preparation Before Plating. W. A. Corse. *Plating,* v. 37, Apr. 1950, p. 375-377, 383.

Mechanical belt polishing of flat surfaces, manual belt polishing with backstands, and brush-backed polishing. These methods all make use of coated abrasives and produce finishes in the range of 25 micro-inches or less. (L10)

242-L. Plating on Plastics. *Plating,* v. 37, Apr. 1950, p. 384-388.

Equipment and procedures of Plastiplate Co. While Cu is most commonly used, Ag, Ni, Pb, and other metals are also deposited. (L17, EG-a)

243-L. Determination of Impurities in Electroplating Solutions. XVIII. Traces of Chromium in Copper Plating Baths. Earl J. Serfass, Mary H. Perry, and Sanjoy Sen. *Plating,* v. 37, Apr. 1950, p. 389-393.

Colorimetric methods for determination of chromate Cr and total Cr in Cu plating baths were developed, which are accurate to 5% for Cu concentrations of 6-26 mg. 14 ref. (L17, S11, Cr, Cu)

244-L. Diamond Abrasives Finish Huge Molds. D. R. Siragusa. *American Machinist,* v. 94, Apr. 3, 1950, p. 124-126.

Procedure used to finish molds for plastic television cabinets—the largest commercial one-piece molding made to date. Crucible CSM-2 tool-steel is used. (L10, T29, TS)

245-L. Palm Trees by Proxy: An Adventure in Research. *Steelways,* v. 6, Mar. 1950, p. 24-25.

Production of tin-plate, with emphasis on use of palm oil. Development of synthetic oil substitute at Armour Research Foundation. (L17, CN, Sn)

246-L. The Metallising of Non-Metallic Materials. G. T. Colegate. *Ceramics,* v. 2, Mar. 1950, p. 32-36.

Some methods for metallizing of ceramics and similar materials. (L23)

247-L. Cut Wire Shot Lowers Cleaning and Peening Costs. D. A. Cargill. *Iron Age,* v. 165, Apr. 6, 1950, p. 95-97.

Shot is made from carbon steel comparable to SAE 1065 in analysis. By proper balance of heat treating and cold working, wire with tensile strengths over 250,000 psi., hardnesses of Rockwell C-48 to 52, high ductility, and long fatigue life, is produced. New technique using a high-speed rotary-shear principle cuts multiple wires into accurately sized pieces at reasonable cost. In use, the shot quickly becomes spherical. Users report reductions of as much as 50% in peening costs and 30 to 80% in cleaning operations. (L10, G23, T5, CN)

248-L. Heavy Nickel Plating for Salvage; for Corrosion Resistance. P. J. Ritzenthaler. *Iron Age,* v. 165, Apr. 6, 1950, p. 98-101.

Various examples. Savings of over 50% on small pieces and as much as 90% on larger equipment by heavy nickel salvage plating are claimed. Parts requiring corrosion resistance may be made of cast iron or other low-cost material by applying a heavy Ni coat as thick as 0.080 in. (L17, A8, Ni)

249-L. The Performance of Certain Stoving Paints and Other Painting Schemes Used to Protect Steel Sheet Against Atmospheric Corrosion. J. C. Hudson. *Paint Technology,* v. 15, Mar. 1950, p. 101-104.

Results of experiments. Test panels are illustrated. (L26, CN)

250-L. Hard Chrome Plating. Brayton A. Taylor. *Tool Engineer,* v. 24, Apr. 1950, p. C17-C19.

Various applications. (L17, Cr)

251-L. Metallizing Renews Offset Press Cylinders. Elton Sterrett. *Welding Engineer,* v. 35, Apr. 1950, p. 26-27. (L23, T9)

252-L. Black Anodic Finish for Die Cast Aluminum. *Die Castings,* v. 8, Apr. 1950, p. 41-43.

Alumilite process which produces a thin, inert, and durable film of aluminum oxide on the surface which may then be colored by absorption of organic dyes. (L19, Al)

253-L. Conditioning Aluminum Alloys for Electroplating. Fred Keller and Walter G. Zelley. *Journal of the Electrochemical Society,* v. 97, Apr. 1950, p. 143-151.

Various conditioning treatments. Manner in which the treatments and variations in the zinc immersion layer may affect the performance of plated Al alloys. (L17, Al)

254-L. How One Firm Reduced Degreasing and Finishing Costs. W. L. Gwizdowski. *Finish,* v. 7, Apr. 1950, p. 22-23.

Degreasing and finishing layout employing infrared ovens in finishing of electrical-outlet boxes. (L general)

255-L. Titanium Enamel Direct to Titanium Steel. J. B. Simons. *Finish,* v. 7, Apr. 1950, p. 58, 60-61, 67.

Steps in application of enamel. (L27, ST)

256-L. Plastics Combat Well-Head Corrosion in Galveston Bay Fields. J. E. Kastrop. *World Oil,* v. 130, Apr. 1950, p. 162-166.

Use of liquid plastic coatings in mitigation of external well-head corrosion in submerged oil and gas fields where salt-water action is a serious problem. (L26, R4)

257-L. Continuous Strip Pickling. D. Brownlie. *Canadian Metals,* v. 13, Mar. 1950, p. 14, 53.

Equipment. (L12, ST)

258-L. Automatic Control of Plating Operations. Leo Walter. *Machinery* (London), v. 76, Mar. 16, 1950, p. 387-389. (L17)

259-L. Lacquers for Metals; General and Special Applications. E. S. Tonks. *Metal Industry,* v. 76, Mar. 17, 1950, p. 209-211. (L26)

260-L. End Point Indication of the B.N.F. Jet Test for Measurement of Thickness of Cadmium Coatings on Steel. S. G. Clarke and J. F. Andrew. *Journal of the Electrodepositors' Technical Society,* v. 25, 1950, p. 39. (Preprint.)

Results with the solution previously used have occasionally been

unsatisfactory because of lack of contrast between the exposed steel and the Cd plate. Describes solution which produces a bright Hg spot at point of exposed steel while surrounding Cd is blackened.
(L17, Cd, ST)

261-L. Structure of Electropolished Aluminum Surfaces and Their Oxidation. (In French.) H. Raether. *Métaux & Corrosion,* v. 25, Jan. 1950, p. 1-8.

Studied by electron diffraction. Results are compared with those obtained by measurement of solution potential. 22 ref.
(M21, M23, L17, Al)

262-L. Metallization by Aluminum of Industrial Superstructures. (In French.) Maurice Victor. *Revue de l'Aluminium,* v. 27, Jan. 1950, p. 17-19.

Method used by a British firm for automatic continuous grit blasting and aluminum-projection coating of steel girders. (L23, L10, Al, CN)

263-L. Aluminum Coating of Steel. W. C. Reid. *Metal Progress,* v. 57, Apr. 1950, p. 488-489.

Discusses Stroup and Purdy's comparison of costs of various processes (see item 73-L, 1950) intimating that costs of metallizing were improperly represented as being higher than other processes. (L23, Al, CN)

264-L. Titanium Enamel Direct to Steel. F. R. Porter, J. B. Simons, R. F. Bisbee, and C. L. Van Derau. *Better Enameling,* v. 21, Apr. 1950, p. 6-13.

A discussion of the Westinghouse-Inland Steel program. (L27, CN)

265-L. Trouble Shootin'. John L. McLaughlin. *Better Enameling,* v. 21, Apr. 1950, p. 37.

Causes and cures of porcelain-enamel defects known as sagging and scum. (L27, CN)

266-L. Starts Colored Range Output. *Ceramic Industry,* v. 54, Apr. 1950, p. 88-91, 93, 170.

Forming and finishing procedures and equipment of Norge Div.
(L27, G1, CN)

267-L. Enamel Process Defects, Causes and Possible Cures. (Concluded.) M. E. McHardy. *Ceramic Industry,* v. 54, Apr. 1950, p. 97, 179.

Causes and cures of various troubles caused by defects in the steel.
(L27, CN)

268-L. Enameled Nameplates Require 45 Operations. S. G. Brooks. *Ceramic Industry,* v. 54, Apr. 1950, p. 99.

Procedures of D. L. Auld Co., Columbus, Ohio. A Zn-Cu alloy (5-10% Zn + 90-95% Cu) known as gilder's metal is used almost exclusively.
(L27, Cu)

269-L. New Galvanizing Furnace Forms No Dross. Mario Tama. *Iron Age,* v. 165, Apr. 13, 1950, p. 93-96.

Induction-heated, refractory-lined furnace eliminates galvanizer's dross formed by reaction of the container with the molten zinc bath. Close temperature control, absence of fumes, plus better and cheaper coating are claimed. (L16, Zn)

270-L. Electroplated Metals in the Auto Industry. S. E. Sangster. *Products Finishing,* v. 14, Apr. 1950, p. 14-16, 18.

An illustrated survey. (L17, T21)

271-L. Magnesium Processing and Finishing. Gilbert C. Close. *Products Finishing,* v. 14, Apr. 1950, p. 32-34, 36, 38, 40.

Details of new anodic treatment called the Turco-Waterman process which forms a coating of $MgCO_3$ over the metal. Tests indicate superiority over other chemical dip treatments, especially for prevention of sea-water and sea-air corrosion.
(L19, Mg)

272-L. Acid Dips for High Carbon and Low Carbon Steel Prior to Electroplating. *Products Finishing,* v. 14, Apr. 1950, p. 52, 54, 56, 58. Based on discussions by R. M. Wick and I. C. Hepfer.

Wick describes recommended procedures to avoid hydrogen embrittlement and to obtain good adhesion to high-carbon steel. Hepfer gives recommendations for low-carbon steel.
(L17, L12, CN)

273-L. Progress in Electroplating Uncommon Metals and Alloys. *Products Finishing,* v. 14, Apr. 1950, p. 66, 68, 70, 72, 74.

Review of several papers presented at 96th Electrochemical Society meeting. (L17, EG-b)

274-L. More Rapid Paint Baking Accomplished in All-Metal Infra-Red Heater Installation. *Products Finishing,* v. 14, Apr. 1950, p. 80, 82.
(L26)

275-L. High Dross Production in Hot Dip Galvanizing. Wallace G. Imhoff. *Industrial Gas,* v. 27, Apr. 1950, p. 5-6, 25-26, 28.

Ways to reduce dross production by proper furnace design and more uniform heat distribution. (L16, Zn)

276-L. Sherardizing in the Manufacture of Electrical Conduit. A. D. Spillman and J. E. Pittenger. *Industrial Gas,* v. 27, Apr. 1950, p. 7-8.

Process in which a Zn coating is applied to the conduit tubing by rotating in Zn powder in a revolving drum to which heat is applied. During this process the Zn and steel form an alloy and an outer coating

which is practically pure Zn. (L16, T1, Zn)

277-L. "Prepolishing" Before Forming. A. H. Allen. *Steel,* v. 126, Apr. 17, 1950, p. 76-77, 94.

Method employed by a leading automotive-parts plant which practically eliminates tedious and expensive hand polishing of steel stampings prior to plating. Steel sheets are prefinished flat, coated with water-soluble plastic, drawn, then cleaned. (L10, ST)

278-L. "Scotch" Tape: New Protective Coating. *Chemical Engineering,* v. 57, Apr. 1950, p. 246, 248, 250.

Use to wrap welded steel joints of gas mains. (L26, ST)

279-L. Recondition Banbury Mixers. H. C. Linde. *Welding Journal,* v. 29, Apr. 1950, p. 325-326.

Hard-facing methods for rubber-mixing equipment. Mixer frames and rotating elements are Grade B cast steel hard faced with stainless electrodes. (L24, T29, CI, SS)

280-L. New Non-Leafing Aluminum Gives the Sparkle Users Demand. G. M. Babcock and F. B. Rethwisch. *Paint, Oil, and Chemical Review,* v. 113, Apr. 13, 1950, p. 23-24.

Production and properties of the various types of Al pigments. (L26, T29, Al)

281-L. Paints on Submerged Steel Structures. *Paint, Oil and Chemical Review,* v. 113, Apr. 13, 1950, p. 63. Translated and condensed from paper by W. Husse, *Farbe & Lack,* v. 55, 1949, p. 441-444.

Bituminous coatings, use of red lead primers under such coatings, and their properties in comparison with chlorinated rubber and benzyl cellulose coatings. (L26, CN)

282-L. Notes on the Formulation of Industrial Finishes for Metal. M. A. Glaser. *Paint, Oil, and Chemical Review,* v. 113, Apr. 13, 1950, p. 37-38, 40, 42, 44, 46, 48, 50, 52-53.

Some of the more important types of industrial finishes. The various components of finishing systems, and the relationship of each component to the whole and to ultimate performance requirements. (L26)

283-L. Surface Treatment and Finishing of Light Metals. Part 5. (Continued.) S. Wernick and R. Pinner. *Sheet Metal Industries,* v. 27, Apr. 1950, p. 355-362.

Various patented chemical oxidation processes, such as the Pylumin, Alrok, Alodine, Alocrom, Jirotka, Pacz, Protal, McCulloch, and two new German (V.A.W.) processes. Applications of these coatings in organic finishing, deposition of Cu on an oxide coating, and treatment of Al alloy castings containing heavy-metal inserts. 21 ref. (To be continued.) (L14, Al)

284-L. Cobalt and Nickel in the Vitreous-Enamelling Industry. J. E. Hansen. *Sheet Metal Industries,* v. 27, Apr. 1950, p. 363-368.

Uses of compounds of Co and Ni for decorative and practical purposes in enameling frits. 28 ref. (L27, T29, Co, Ni)

285-L. Palm Oil Substitutes for Hot Dip Tinning. George E. Ference, W. R. Johnson, L. C. Kinney, and John M. Parks. *Journal of the American Oil Chemists' Society,* v. 27, Apr. 1950, p. 122-127.

Practical requirements, theory of action, screening tests, and development of two potential substitutes—a dimer acid mix and a modified tallow. (L16, Sn, ST)

286-L. Cementiferous Paints. J. E. O. Mayne. *Journal of the Iron and Steel Institute,* v. 164, Mar. 1950, p. 289-293.

Development of paints based on the reaction between Zn dust and certain phosphate solutions. The paints dry by formation of cement, and sufficient metallic Zn is left to afford cathodic protection to steel. They dry at both high and low humidities; are superior to earlier types based on chlorides when applied to both pickled and rusty surfaces; and are cheap and easy to prepare. (L26, ST)

287-L. Plant for Hard Chrome; A Description of French Plating Installations. M. Loiseau. *Metal Industry,* v. 76, Mar. 24, 1950, p. 229-230. Translated from the French. (L17, Cr)

288-L. New Platings Resist Corrosion. J. Lomas. *Machinery Lloyd* (Overseas Edition), v. 22, Apr. 1, 1950, p. 91-93.

New developments in electrodeposited coatings. (L17)

289-L. Concerning Hydrogen Overvoltage. (In French.) Geneviève Sutra. *Comptes Rendus* (France), v. 230, Feb. 13, 1950, p. 644-645; Feb. 20, 1950, p. 749-750.

Discusses reasons for variations of the above dependent on the cathode metal in electrolytic solutions. Suggests that ions adsorbed on the cathode create a power sufficient for extraction at room temperature of metallic electrons. Table shows values of overvoltage and of energy of extraction (thermionic-emission ener-

gy) for Pt, Au, Ag, Ni, W. Mo, Sn, Ta, Hg, and graphite. Theoretical basis is discussed. (L17, P15)

290-L. Overvoltage and Electropolishing. (In French.) René Audubert, Maurice Bonnemay, and Eugène Lewartowicz. *Comptes Rendus* (France), v. 230, Feb. 13, 1950, p. 646-648.

Attempts to discover whether or not Audubert's theory of the overvoltage can be applied to electropolishing. Data indicate that, by measurements at different temperatures, it is possible to determine the energies of activation necessary for different processes. (L13)

291-L. Discussion of the Anodic Polishing of Metals. (In German.) K. Huber. *Chimia,* v. 4, Mar. 15, 1950, p. 54-62.

Theory, phenomena, and experiences in electropolishing, properties of electropolished metal surfaces, and analysis of the voltage curves of different electrolytic baths. The distinction between activation and concentration polarization is explained and an example is given of the electropolishing of Zn in NaOH. (L13)

292-L. The Corrosion Resistance of Hard-Chromium Plating. (In German.) Heinz W. Dettner. *Metalloberfläche,* sec. A, v. 4, Mar. 1950, p. 33-37.

Shows experimentally that corrosion resistance depends on the conditions of electroplating and that the lowest corrosion resistance is obtained when the bath temperatures are between 45 and 53° C. Differences in corrosion resistance are explained on the basis of different structural modifications of the deposit. 13 ref.
(L17, R general, Cr)

293-L. Experience and Test Results on the High-Luster Nickel Plating of Polished Copper and Brass Parts. (In German.) A. Hofmann. *Metalloberfläche,* sec. B, v. 2, Mar. 1950, p. 38.

Causes of defective plating.
(L17, Ni, Cu)

294-L. Electropolishing of Steel. (In German.) Josef Heyes and Wilhelm Anton Fischer. *Metalloberfläche,* sec. A, v. 4, Mar. 1950, p. 38-44.

Reviews the literature and evaluates experimental results of various investigators. 15 ref. (L13, ST)

295-L. (Book) **Das Polieren der Metalle: Schleif und Poliertechnik; Handbuch des gesamten Schleif-und Polierwesens.** (Polishing of Metals: Abrasion and Polishing Methods; Handbook of All Abrasion and Polishing Methods.) B. Kleinschmidt. 1948. Technischer Verlag Herbert Cram, Berlin, Germany. 14 DM.

A general survey of the polishing of metals. Short accounts of the various abrasives and of the different metals and machines used in these processes. (L10)

296-L. Selection and Application of Cleaning Room Equipment. Stanley Krzeszewski. *American Foundryman,* v. 17, Apr. 1950, p. 96-101.

Advantages and limitations of various types of equipment and procedures for cleaning up castings to prepare them for use or subsequent operations. Includes shot or grit airless blasting, tumbling, sand blasting, wet blasting, and pickling. Advantages of the first method.
(L10, L12)

297-L. An Efficient Flow-Coating System. F. M. Burt. *Organic Finishing,* v. 11, Apr. 1950, p. 24-26.

System used to coat metal items which cannot successfully be spray-painted due to irregularity of shape, sharp edges, small surfaces, and other factors. (L26)

298-L. Sprayed Metal Coatings Improve Corrosion Resistance of Wide Range of Products. John E. Wakefield. *Materials & Methods,* v. 31, Apr. 1950, p. 67-69.

Use of metallizing for applying corrosion resistant nonferrous coatings. Tabular data on costs, rates of application, and life expectancies. Information deals with Zn, Al, Sn, and Pb, with emphasis on the first two. (L23, Zn, Al, Sn, Pb)

299-L. Electrostatic Process Improves Casting Finish. Thomas A. Dickinson. *Western Metals,* v. 8, Apr. 1950, p. 36-37.

Use of high-voltage, low-amperage electricity to polarize castings and sealants (or coating compounds) so that electromagnetic attraction will increase the number of sprayed particles that can be spray deposited without any extensive waste of finish materials; and will "detear" or remove excess materials from castings which have been pressure-sealed or dip-coated. (L26)

300-L. Fastest Electrolytic Tinplate Line Unwrapped by Weirton Steel Corp. *Iron Age,* v. 165, Apr. 27, 1950, p. 106-107.

Includes coiling, shearing, and inspection. (L17, F29, S13, CN, Sn)

301-L. Cleaning and Painting Yorkaire Units. Walter J. Fridinger. *Industrial Finishing,* v. 26, Apr. 1950, p. 26-27. 30, 32.

Finishing of air-conditioning units. (L12, L26)

302-L. Mass Production Finishing of Aluminum Refrigerator Pans. L. J. Reinhardt. *Industrial Finishing,* v. 26, Apr. 1950, p. 36-38, 40, 42.

Chemical washing, surface treating, oven dry-off, tack-ragging, spray painting, and electric-oven baking. (L26, Al)

303-L. Painting and Decorating Trailer Trucks. *Industrial Finishing,* v. 26, Apr. 1950, p. 50, 53-54.

Cleaning the metal; etching sheet-Al surfaces; and spray coating with various finishes. (L general, T21, Al)

304-L. Painting and Decorating Roadmaster Bicycles. C. J. Janosek. *Industrial Finishing,* v. 26, Apr. 1950, p. 60-62, 66, 68.

Includes cleaning and surface treatment. (L26, CN)

305-L. Avoiding Enamel Difficulties Through Proper Furnace Operation. M. Bozsin. *Finish,* v. 7, May 1950, p. 25-27, 78.

Control equipment and recommended procedures. (L27)

306-L. Filtering Practice for Plating Solutions. K. L. Carr. *Finish,* v. 7, May 1950, p. 29-30.

Some notes on filtration of various plating solutions with reference to methods and types of baths. (L17)

307-L. Brighter Finishes With "PR" Plating. George W. Jernstedt. *Steel,* v. 126, May 1, 1950, p. 86-88, 108, 110, 113-114, 116.

How periodic-reverse-current plating with a new inorganic addition agent is solving many electroplating problems, producing high luster and uniform density plates. On some applications, buffing and polishing costs can frequently be eliminated completely. Process is applicable to a wide variety of metals. (L17)

308-L. Sheet Metal Parts Degreased in Radiant Heat Oven. *Industrial Heating,* v. 17, Apr. 1950, p. 676-677.

Procedures at Lawson Mfg. Co., Pittsburgh. (L12)

309-L. Finishing Men's Jewelry and Haberdashery Hardware. *Plating,* v. 37, May 1950, p. 490-494.

Procedures at Hickok Manufacturing Co. (L17)

310-L. Preparation and Finishing of Metal Surfaces. B. M. Letsky. *Paint Manufacture,* v. 20, Apr. 1950, p. 124-127.

A general survey. (L26)

311-L. Plumbates as Paint Pigments. *Paint Manufacture,* v. 20, Apr. 1950, p. 128-132; discussion, p. 132-133, 139.

Use of alkaline-earth plumbates as pigments in paints designed to protect steel against corrosion and to reduce lead consumption as compared with other lead pigments. Experimental preparation, properties, and exposure-test results. Illustrated. (L26)

312-L. Methods for the Protection of Magnesium Alloys. W. F. Higgins. *Electroplating and Metal Finishing,* v. 3, Apr. 1950, p. 287-291.

Various coating methods for corrosion prevention. (L general, Mg)

313-L. Chemical Polishing; Some Technical Details. *Electroplating and Metal Finishing,* v. 3, Apr. 1950, p. 295-296.

Specific information concerning process developed at Battelle Memorial Institute and applicable to Cu, Ni, brass, monel, and german silver. (L12, Cu, Ni)

314-L. Producing Porcelain Enameled Signs. Thomas A. Dickinson. *Ceramic Age,* v. 55, Apr. 1950, p. 238-239.

Procedures. (L27, CN)

315-L. Plating on Aluminium. R. H. Keller. *Plating Notes,* v. 1, Dec. 1949, p. 66-93.

A review of various processes, indicating principal difficulties encountered, uses, and also methods of surface preparation prior to plating, and for testing the deposits. 45 ref. (L17, Al)

316-L. Galvanizing of Steel Sheets; Operational Formulae. John H. Mort. *Iron and Steel,* v. 23, Mar. 1950, p. 74-78; Apr. 1950, p. 125-130.

Hot-dip galvanizing equipment and procedures. Details of calculations required in the plant. (L16, CN, Zn)

317-L. Fusing of Enamels. J. A. Clarke. *Foundry Trade Journal,* v. 88, Apr. 6, 1950, p. 371-376; discussion, p. 376, 380.

Some general features of the process. Furnace design, instruments, atmospheres, refractories, and operational methods. Results of firing for varying times on metal samples. Development of the final finish is traced with particular emphasis on its chemical and physical aspects and on gas-bubble formation. (L27)

318-L. De-Enamelling. *Foundry Trade Journal,* v. 88, Apr. 6, 1950, p. 377-380.

Discusses paper by B. B. Kent (Feb. 2 issue; item 151-L, 1950). (L27)

319-L. From a Metallurgist's Notebook: Defective Deposits. H. H. Symonds. *Metal Industry,* v. 76, Apr. 7, 1950, p. 269-270.

Minute oxide or flux inclusions on

or near the surface of the base metal were found to be the origin of defects in the deposit on silver-plated copper trays. (L17, Ag, Cu)

320-L. Antimony Plating; Bright Deposits From Complex Citrate Baths. K. G. Soderberg and H. L. Pinkerton. *Metal Industry,* v. 76, Apr. 7, 1950, p. 271-273. A condensation.

See abstract from *Plating,* item 169-L, 1950. (L17, Sb)

321-L. Improved Protection Against Corrosion. (in German.) P. Tesdorff. *Erdöl und Kohle,* v. 3, Mar. 1950, p. 127-128.

The "Sinoxal" process, in which an applied undercoat of a suitable material forms a crystalline, nearly nonporous and electrically passive film on steel surfaces, protecting the latter against many kinds of chemical corrosion. (L14, CN)

322-L. Cleaning Copper Parts. *American Machinist,* v. 94, May 1, 1950, p. 113.

Recommended procedures for removal of miscellaneous dirt. (L10, L12, Cu)

323-L. Stainless Steel Fabricating Costs Cut $100 Per Day. Arthur P. Schulze. *Steel,* v. 126, May 8, 1950, p. 82-84.

By using strippable plastic coatings, one manufacturer of commercial refrigeration cabinets expedites assembly and improves protection of stainless-steel sheets during fabrication, hiking production 14%. (L26, G general, SS)

324-L. Processing Cycles for Chromium Plating. Jerome L. Bleiweis. *Products Finishing,* v. 14, May 1950, p. 38, 40, 42, 44.

Recommended cycles for application of Cr plate to ferrous metals, Cu alloys, Zn die castings, Pb-base alloys, Al alloys, Mg alloys, and buffed Ni plate. (L17, Cr)

325-L. Developments in Galvanizing. F. G. White. *Products Finishing,* v. 14, May 1950, p. 48, 50, 52, 56. (L16, Zn, ST)

326-L. Metal Coatings Formed by Methods Other Than Electrodeposition. Allen G. Gray. *Products Finishing,* v. 14, May 1950, p. 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80.

Review of recent work at Battelle, Alcoa, and Commonwealth Engineering Co. Emphasizes paper presented by Bruce W. Gonser at section meetings of American Chemical Society and Electrochemical Society. Includes hot dip coatings, vapor-phase deposition, carbonyl gas plating, vacuum evaporation, and sprayed metal coatings. (L16, L23, L25)

327-L. Infra-Red Dries Porcelain Enamel Rapidly. *Products Finishing,* v. 14, May 1950, p. 88-89. (L27)

328-L. Power Brushing Used for Cleaning Shovel Blades. *Products Finishing,* v. 14, May 1950, p. 89. (L10)

329-L. Corrosion Protection of Power Transformers by Flow Coat Method. Siebert L. Miller. *Corrosion* (Technical Section), v. 6, May 1950, p. 144-147.

Results of several years' experience and experimentation using the Flow Coat method of applying stripping media and protective coatings. Advantages and possible disadvantages. (L26, T1)

330-L. Surface Preparation Values and Sandblasting Economics. A. J. Liebman. *Corrosion* (Technical Section), v. 6, May 1950, p. 151-157.

How necessary amount of surface preparation from technical and economic standpoints can be determined by preliminary calculations. Suitable surface-preparation methods with emphasis on sandblasting. Degree of cleanliness required should be specified in order to eliminate unnecessary work. Type of sand and grain size, as well as equipment, are also important. (L10)

331-L. Laboratory Tests of Protective Coatings Versus Service Results. W. T. Moran and G. E. Burnett. *ASTM Bulletin,* no. 165, Apr. 1950, p. 73-77; discussion, p. 77-80.

Relative merits and some experiences of the Bureau of Reclamation, with emphasis on protective coatings for metal work. (L general, S21)

332-L. New Electrolytic Line Boosts Nation's Tin Plate Capacity. *Steel,* v. 126, May 15, 1950, p. 104, 106.

Pickling, plating, and shearing equipment and procedures at new line of Weirton Steel. (L17, F29, CN, Sn)

333-L. Protective Coatings for Underwater Steel Structures. A. W. Van Heuckeroth, R. W. Hill, and G. S. Cook. *Symposium on Varnish and Paint Chemistry,* (College of Engineering, New York University), 1949, p. 41-50.

Conditions to be met and systems studied. (L26, ST)

334-L. Fungicidal and Solvent Retention Problems in Organic Film Coatings. Aubrey J. Raffalovich. *Symposium on Varnish and Paint Chemistry.* (College of Engineering, New York University), 1949, p. 51-60.

Coatings used in tropicalization of

Signal Corps equipment. Includes micrographs and discussion of various coatings on steel, Cu, brass, glass, and phenolic plastic.
(L26, ST, Cu)

335-L. The Electropolishing of Nickel in Urea-Ammonium Chloride Melts. T. P. Hoar and J. A. S. Mowat. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950. (Advance Copy No. 1, 19 pages.)

Investigation to find the range of conditions under which electropolishing occurs. Its mechanism.
(L13, Ni)

336-L. The Commercial Electrolytic Polishing of Stainless Steels. P. A. Charlesworth. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950, (Advance Copy No. 2, 11 pages.)

New technique for and conditions for a commercial process. Solution, commercial-scale working, applications, advantages, and limitations.
(L13, SS)

337-L. New Developments of Electrolytic Polishing. H. E. Zentler-Gordon. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950. (Advance Copy No. 3, 8 pages.)

Mechanical vs. electrolytic polishing. Application to stainless and carbon steels, brasses, Al, and Al alloys.
(L13, CN, SS, Cu, Al)

338-L. The Electrodeposition of Copper-Cadmium Alloys From Cyanide Solutions. E. E. Longhurst. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950. (Advance Copy No. 5, 19 pages.)

Conditions under which Cu-Cd alloys can be deposited. Effect of "free" cyanide, pH of solution, current density, and temperature. 11 ref. (L17, Cu, Cd)

339-L. The Electrodeposition of Tin-Cadmium Alloys. P. S. Bennett. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950. (Advance Copy No. 6, 8 pages.)

Method for co-depositing Sn and Cd on steel from acid solutions of their sulphates using suitable addition agents. Corrosion resistance and solderability. 17 ref.
(L17, R general, K7, Cd, Sn, ST)

340-L. Further Work on the Electrodeposition and Properties of Speculum. P. S. Bennett. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950. (Advance Copy No. 7, 12 pages.)

Bright speculum (40% Sn) plate may be obtained by addition of organic brighteners, alone or in conjunction with small amounts of Pb. For consistent deposits, extremely close control of all variables is necessary and current density must be as uniform as possible. Close chemical control of bath composition is essential. 12 ref. (L17, Cu)

341-L. The X-Ray Structure of Speculum Electrodeposits. H. P. Rooksby. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950. (Advance Copy No. 8, 6 pages.)

Investigations on a (42% Sn) alloy deposited on Cu. Factors influencing bright or dull finish.
(L17, M22, Cu)

342-L. Studies in the Discontinuities in Electrodeposited Metallic Coatings. U. R. Evans and S. C. Shome. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950. (Advance Copy No. 9, 24 pages.)

Ni and Co deposits were investigated. Effects of H_2 bubbles at the cathode, impurities on surface of base metal, surface contour of base metal, and internal stresses in deposit or base metal on discontinuities. Effects of current density, pH, and temperature on porosity. Composite plates of Ni and Cu, Co and Ni, and Co and Cr showed no promise of avoiding pinholes. 27 ref.
(L17, Ni, Co, Cu, Cr)

343-L. The Electrodeposition of Tin From Stannous Fluoborate Baths. N. Parkinson. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950. (Advance Copy No. 10, 8 pages.)

Advantages, due to high rates of deposition. Composition of electrolyte, addition agents, plating equipment, base metals, pretreatments, anode behavior, and analytical control. Experimental results.
(L17, Sn)

344-L. The Etching of Aluminum for Direct Plating With Other Metals. J. M. Bryan. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950. (Advance Copy No. 11, 6 pages.)

Development of a new process. Simple test, using a solution of iodine, for selecting etchants; washing procedure. Electrodeposition and chemical-displacement deposits of Ni and Cu were studied.
(L17, Al, Ni, Cu)

345-L. "Emulsion" Cleaning of Metals. G. Schmerling. *Journal of Electrodepositors' Technical Society,* v. 26, 1950. (Advance Copy No. 12, 8 pages.)

Composition, methods of using, advantages, characteristics, and applications of emulsion cleaners. (L12)

346-L. Surface Active Agents in the Improvement of the Cleaning of Metals. R. C. Tarring. *Journal of the Elec-*

trodepositors' Technical Society, v. 26. 1950. (Advance Copy No. 13, 8 pages.)

The actual relationship between solution and solid surface at the area of contact. (L12)

347-L. Porous Chrome Plating: The Chesterfield Works of British van der Horst Ltd. *Metal Industry*, v. 76, Apr. 21, 1950, p. 307-309.

(L17, Cr, ST)

348-L. Tin Coatings on Steel as a Basis for Protective Painting. S. C. Britton. *Journal of the Oil & Colour Chemists' Association*, v. 33, Mar. 1950, p. 125-134; discussion, p. 134-136.

Methods of applying tin coatings; corrosion resistance; adhesion of paint films to tin coatings; and the mode of action of tin under paint. Illustrations of exposure and adhesion test specimens. 11 ref. (L26, L16, Sn, ST)

349-L. Plastics in the Plating Shop. V. Evans. *British Plastics*, v. 22, Apr. 1950, p. 162-170.

Miscellaneous applications. 15 ref. (L17)

350-L. Pickling Tanks; Modern Developments in Construction. V. Evans. *Iron and Steel*, v. 23, Apr. 1950, p. 116-120.

12 ref. (L12)

351-L. Mechanism of Electrolytic Oxidation and of Formation of Aluminum Oxide Layers. (Concluded.) Jos. Patrie. *Revue de l'Aluminium*, v. 27, Jan. 1950, p. 3-7.

Conditions of electrolytic oxidation—influence of temperature of the bath and time of operation on properties of the oxide layer, from the point of view of resistance to corrosion and to wear—were investigated. Methods of determination of hardness and resistance to wear of such oxide layers. 32 ref. (L19, Al)

352-L. Mechanism of Vapor Deposition of Chromium and Other Elements. (In French.) Philippe Galmiche. *Comptes Rendus* (France), v. 230, Mar. 20, 1950, p. 1181-1183.

Practical apparatus and procedure for deposition of Cr, Si, Al, Zr, etc., on iron or steel, by vapor diffusion from a special solid mixture, which releases the desired metal on heating in a stream of hydrogen. (L25, Fe)

353-L. Determining the Adhesion of Enamel to Sheet Steel. (In German.) A. Dietzel and E. Wegner. *Berichte der Deutschen Keramischen Gesellschaft e. V. und des Vereins Deutscher Emailfachleute e. V.*, v. 26, Sept.-Oct. 1949, p. 132-137.

Advantages and disadvantages of different methods. Recommends Stuckert's method in which adhesiveness is determined by measuring the amount of "whiteness" on the metal surface after the enamel is mechanically removed. A system of classifying degrees of adhesiveness is also proposed. (L27, ST)

354-L. Observations on Sulfide Under-Coatings. (In German.) A. Dietzel. *Berichte der Deutschen Keramischen Gesellschaft e. V. und des Vereins Deutscher Emailfachleute e. V.*, v. 26, Sept.-Oct. 1949, p. 137-141.

Undesirable effects of too much sulfur in enamel undercoats on steel. Recommends compounds which form soluble sulfosalts (complexes) which are more resistant to oxidation than the simple sulfides. 11 ref. (L27, ST)

355-L. Research on Improvement of the Adhesion of Thick Silver Electrodeposits. (In Japanese.) Tadayoshi Inui. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Sept. 1949, p. 28-31.

Procedure for production of deposits having good adhesive properties, consisting of removal of occluded hydrogen by anodic or thermal treatment, polishing and cleaning, acid dipping, plating (conditions given), and annealing. (L17, Ag)

356-L. Protection of Al Alloys Against Corrosion. (In Japanese.) Hikozo Endo and Akira Itagaki. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Nov. 1949, p. 30-34.

Chemical and electrochemical methods developed by the authors. In the first, the alloys are treated at 60° C. with 2% NaOH for 2-3 min., then with a mixed aqueous solution of CaO, $CaSO_3$, $K_2Cr_2O_7$, KNO_3, Na_2SiO_3, and $KMnO_4$ for 20-30 min. In the second, the alloys are pretreated for 30 sec. with 2-3% NaOH at room temperature, then electrolyzed in 25% H_2SO_4, using a.c. for 5-60 min. Effectiveness was compared by immersion in 3% NaCl. 24 ref. (L14, Al)

357-L. Drag-Out Losses in Wire Plating. Part I. Joseph B. Kushner. *Wire and Wire Products*, v. 25, May 1950, p. 414-415, 418.

Determination of drag-out and liquid-film thickness. Drag-out is of considerable interest, particularly where precious metals such as gold and silver are being plated. It is the thin liquid film that clings to a wire as it emerges from the plating bath. (To be continued.) (L17, Ag, Au, EG-c)

358-L. Mill Rolls Salvaged by Stainless Facing. *Iron Age*, v. 165, May 18,

1950, p. 94.

How surfacing forged or cast steel conveyer rollers with stainless steel helped solve an acute maintenance problem for a large midwestern steel company. (L24, T5, CN, CI, SS)

359-L. Automatic Electric Hard Facing. Turner G. Brashear, Jr. *Welding Journal,* v. 29, May 1950, p. 391-398.

Methods and fields open to the automatic submerged-melt hard-facing process. Varied applications. (L24)

360-L. Corrosion in Salt Water Drilling. Lloyd A. Brudvig. *Drilling,* v. 11, May 1950, p. 60-61.

Emphasis on use of liquid plastic antifouling coating for protection of metal surfaces. Cu_2O is included in the formulation. (L26)

361-L. Brass Offers Colorful Possibilities as an Electroplated Finish for Die Castings. I. *Die Castings,* v. 8, Apr. 1950, p. 37-39; May 1950, p. 43-46.

Principles of brass plating; bath compositions and methods of control. Plating on Zn-base die castings. 13 ref. (L17, Zn, Cu)

362-L. Finishes for Zinc. *Die Castings,* v. 8, Apr. 1950, p. 49-50.

Four main types are mechanical, chemical, organic and plated finishes. (L general, Zn)

363-L. Shop Coat Structural Steel Paint Primers. S. C. Frye and G. Diehlman. *Bethlehem Steel Co. and National Lead Co.,* Progress Report No. 1, Apr. 1948, 56 pages.

See abstract of "An Investigation of Structural Steel Shop Coat Priming Paint," by S. C. Frye, *Corrosion,* item 7B-201, 1949. (L26, CN)

364-L. Tumbling for Low-Cost Finishing. Adolph Bregman. *Metal Progress,* v. 57, May 1950, p. 625-628, 680, 682, 686, 688, 690, 692, 694.

General principles, procedures, and equipment. Characteristics of the carrier or rolling medium and of the finishing compounds (abrasives, lubricants, cleaners, and corrosion inhibitors). Dry tumbling. Recommends wider application of tumbling. (L10)

365-L. Fishing Tackle Britehoned and Plated. Herbert Chase. *Iron Age,* v. 165, May 25, 1950, p. 75-77.

Equipment and procedures. Britehoning consists of two phases—polishing and honing—both conducted in the same barrel with the same chips, but with a different compound. Parts are chiefly brass and stainless steel, but some are also nickel, silver, and aluminum. (L10, Cu, SS, Al)

366-L. Hardfacing. F. W. Weigel. *Machine Design,* v. 22, May 1950, p. 126-128.

Provision for hard facing in original design results in greatly increased capacity and service life. Hard facing of a worm shaft for a large mechanical screw press. (L24, ST)

367-L. Finishing Door Chimes at the Nutone Factory. William R. Cutter. *Industrial Finishing,* v. 26, May 1950, p. 48-50, 52, 54, 56, 58.

Equipment and procedures. Parts are brass, steel, and aluminum. Includes preliminary surface treatment. (L general, Cu, ST, Al)

368-L. Electric Burn-Off Oven Cleans Metal Stampings. J. I. Kolb. *Industrial Finishing,* v. 26, May 1950, p. 70-72, 74.

Automatic cleaning of stamped sheet-metal parts for floor furnaces. (L12)

369-L. Adherence of White Titanium Enamels to Ti-Namel, Effect of Nickel Deposition, Enamel Thickness and Extra Firing. J. E. McFarland. *Better Enameling,* v. 21, May 1950, p. 6-12.

Experimental data. "Ti-Namel" is a special Ti-bearing enameling steel. (L27, AY)

370-L. Trouble Shootin'. John L. McLaughlin. *Better Enameling,* v. 21, May 1950, p. 33.

Porcelain-enamel defect known as chipping; causes and remedies. (L27)

371-L. Weirton Starts New Electrolytic Tinning Line. *Iron and Steel Engineer,* v. 27, May 1950, p. 99-101. (L17, Sn, CN)

372-L. Recent Technical Developments in the Vitreous Enamelling of Light Alloys. R. P. Fraser, A. L. Cianchi, and J. M. Connor. *Sheet Metal Industries* v. 27, May 1950, p. 451-459.

Application of vitreous enamel to Al; vitreous enamels containing Pb; leadless enamels for Al; and other practical considerations. (L27, Al)

373-L. Applications of Electrostatic Spraying and Detearing in Metal Finishing. John Stribley. *Sheet Metal Industries,* v. 27, May 1950, p. 460-466.

The processes, their principles and functions, and their particular application to large-scale industrial finishing. (L26)

374-L. Soft Grits Provide Low Cost Method for Blast Cleaning Metals. T. F. Clark and E. C. Lathrop. *Ma-*

terials & Methods, v. 31, May 1950, p. 67-69.

How grits from agricultural residues, such as corncobs, rice and nut shells, can be used in conventional blasting equipment for degreasing, removing welding scale, and cleaning metal surfaces prior to plating. (L10)

375-L. Vinyl Protective Film. E. E. Halls. *Aircraft Production,* v. 12, May 1950, p. 176-177.

Some notes on applications and properties of plastic coatings for metals. (L26)

376-L. Protection of Magnesium Alloys. E. E. Halls. *Electroplating and Metal Finishing,* v. 3, May 1950, p. 339-346.

Comparative data on the corrosion resistance afforded by various types of organic finishes and chemical pretreatments.
(L14, L26, R general, Mg)

377-L. Anticorrosive Coatings. *Paint, Oil, and Chemical Review,* v. 113, May 25, 1950, p. 45. Condensed from paper by A. G. Sussex, *Australian Paint Notes,* v. 4, 1949, p. 348-357.

Discusses the above from the corrosion engineer's viewpoint.
(L26, R general)

378-L. From a Metallurgist's Notebook: Anodized Aluminum. H. H. Symonds. *Metal Industry,* v. 76, May 5, 1950, p. 345-346.

Fading of an anodized Al panel was believed to be caused by the action of sunshine or effects of abrasion on cleaning. Tests were carried out on similar plates to examine fading after exposure to ultraviolet radiation of varying intensity. Conclusions as to the behavior of various finishes on such panels under these conditions. 18th report of series. (L19, Al)

379-L. New Finish for the Decoration and Protection of Aluminium. John M. Perfect. *Light Metals,* v. 13, May 1950, p. 235-239.

Advantages of finish developed by alumilite and Alzak, Ltd., in Britain, and known as "Enamel Plating". (L26, Al)

380-L. Electrical Resistance of the Anodic Layer and Optimum Composition of Electropolishing Baths. (In French.) E. Darmois, I. Epelboin, D. Amine, and C. Chalin. *Revue de Métallurgie,* v. 47, Mar. 1950, p. 183-186.

Influence of composition of the electropolishing bath on electrical resistance of the anodic layer was investigated for Armco iron, 50-50 Fe-Ni, 76% Ni Permalloy, and Mond nickel. On the basis of the results, use of these values for determination of optimum composition of electrolytes for electropolishing is proposed. (L13, Fe, Ni)

381-L. A New Method of Thermal Chromizing and Formation of Mixed Alloys as a Result of Diffusion. (In French.) P. Galmiche. *Revue de Métallurgie,* v. 47, Mar. 1950, p. 192-200.

Existing methods for chromizing, and a new method applicable to low-carbon steel and to nonferrous alloys. Anticorrosion properties of metals and alloys chromized by the new method. Formation of alloys near the surface layer during chromizing. Applications of the method. 16 ref. (L15, CN, Cr)

382-L. Unsuitable Ferrous Surfaces for Hot Galvanizing. (In German.) Heinz Bablik. *Metalloberfläche,* sec. A, v. 4, Apr. 1950, p. 49-53.

The most common causes of defective hot-dip Zn plating. Recommends that cast iron be decarburized at the surface to obtain good adherence and diffusion between Zn and Fe. (L16, CI, Zn)

383-L. Rust-Preventive Effects of Red Lead, Graphite, and Iron Oxide Mixtures. (In German.) Kurt Basting. *Metalloberfläche,* sec. A, v. 4, Apr. 1950, p. 54-61.

Experiments were made to test the relative effectiveness of above mixtures dispersed in two different types of lacquer. (L26, Fe)

384-L. Effects of Inhibitors on the Acid Pickling of Steel. Part II. (In Polish.) M. Smialowski, J. Synowiec, and M. Szota. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 2, No. 1, 1950, p. 31-35.

Ten kinds of structural steel were investigated with respect to inhibition efficiency of dibenzylsulfide in H_2SO_4 at 40° C. Results could not be satisfactorily correlated. Further experiments were made on mixtures of electrolytic Fe powder with 2% Ni or Cu powder added. Rate of H_2 evolution from 2*N* H_2SO_4 solution was investigated as a function of time and inhibitor added. Adsorption of aniline and diphenylamine (weak H_2SO_4 inhibitors) on electrolytic Fe powder was then studied. Shows how amount adsorbed can be accurately determined colorimetrically. (L12, ST)

385-L. A Comparison of Warpage and Crossbending Test Results. D. R. Goetchius and E. E. Bryant. *Enamelist,* v. 27, Spring 1950, p. 7-9. (A condensation.)

See abstract of "Warpage and Cross-Bending Tests as Criteria of

Resistance of Enamels Under Stress in Service," *Journal of the American Ceramic Society.* See item 199-S, 1950. (L27, S21)

386-L. Finishing of Aerocoach Buses Speeded in Radiant-Fired Forced-Convection Ovens. Arthur Q. Smith. *Industrial Heating,* v. 17, May 1950, p. 857-858, 860, 862, 864.

Metals involved are steel and aluminum. Illustrated. (L26, T21, ST, Al)

387-L. Silver and Aluminum Polishes. Cornelia T. Snell. *Chemical Industries,* v. 66, May 1950, p. 701-702, 704.

Various formulations and their properties. (L12, Ag, Al)

388-L. Creole-Shell Siburua Water Line Is Coated Inside by New Method. Robert L. Buck. *Oil and Gas Journal,* v. 49, May 25, 1950, p. 114, 116, 119.

Procedure developed for internal cleaning and coating of multiple-jointed steel pipe with hot pipe-line enamel. (L26, CN)

389-L. Choice of Electrodeposited Coatings. Clarence H. Sample. *Plating,* v. 37, May 1950, p. 482-484; June 1950, p. 618, 623-624, 633.

A general discussion. 38 ref. (L17)

390-L. A Hint for Hard Facing. E. H. Frail. *Welding Journal,* v. 29, June 1950, p. 492. (L24)

391-L. Armco Takes Wraps Off Sendzimir Galvanizing Process. K. Oganowski. *Iron Age,* v. 165, June 8, 1950, p. 71-74.

Sendzimir continuous galvanizing process which substitutes oxidation and reduction for pickling and requires no flux in zinc bath. Stressing accurate control, it yields a highly uniform product with a coating of tenacious adherence on iron and steel. (L16, Zn, ST)

392-L. Avoiding Enamel Difficulties Through Proper Furnace Operation. Part II. M. Bozsin. *Finish,* v. 7, June 1950, p. 22-24, 56.

Recommendations, mainly in connection with temperature control and instrumentation. (L27)

393-L. Filtration for Nickel and Neutralizer Solutions. Harold W. Faint. *Finish,* v. 7, June 1950, p. 25-26, 64.

Last of a series of three articles on filtration of solutions for paints and varnishes, plating solutions, and pickle-room solutions for porcelain-enameling installations. (L27)

394-L. Classification and Definition of Delayed Defects in Porcelain Enamels. J. H. Keeler, P. K. Chu, and H. M. Davis. *Finish,* v. 7, June 1950, p. 37, 60-61. A condensation.

Various defects are defined and catalogued. (L27)

395-L. Report of Committee B-8 on Electrodeposited Metallic Coatings. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 215-238.

Previously abstracted from *American Society for Testing Materials,* Preprint No. 15. See item 8-187, 1949. (L17, S22)

396-L. Report of Committee D-1 on Paint, Varnish, Lacquer, and Related Products. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 305-317.

Previously abstracted from *American Society for Testing Materials,* Preprint No. 51. See item 7A-83, 1949. (L26, S22)

397-L. Evolution of U. S. Tinplate Practice. R. E. Zimmermann. *Mining Journal* (London), v. 234, May 26, 1950, p. 549-550. (A condensation.)

Benefits of persistent research to producer and consumer, particularly in the U. S. Steel Corp. (L17, ST, Sn)

398-L. The Surface Quality of Hard-Chromium Plated Parts. (In German.) Walter Eilender, Heindrich Arend, and Heinz W. Dettner. *Metalloberfläche,* sec. A, v. 4, May 1950, p. 69-71.

It was found that the surface is rougher than that of parts plated with soft chromium. Recommends that parts be electropolished before plating and that a low current density be used. (L17, Cr)

399-L. Removing Grease With Lye in Metal Working. (In German.) Richard Justh. *Metalloberfläche,* sec. A, v. 4, May 1950, p. 72-76.

Chemistry involved in the removal of mineral oils and fats with different types of salts and alkalies. Especially recommends use of trisodium phosphate because it hardly corrodes the metal, yet is very soluble in water. (L12)

400-L. Technique of Preparation of Aluminum Alloys for Resistance Welding. (In Russian.) A. I. Prigachev. *Avtogennoe Delo* (Welding), Feb. 1950, p. 21-25.

Existing methods were investigated. Influence of different methods of surface treatment on the value of contact resistance and on the constancy of strength of the weld. Analysis of several chemical methods of surface treatment revealed that best results are obtained by dipping in an aqueous solution of

orthophosphoric acid and a dichromate. (L14, K3, Al)

401-L. Aircraft Finishing Techniques Stress Utility. Gilbert C. Close. *Products Finishing,* v. 14, June 1950, p. 56-60, 62.

Protection of metal during storage and fabrication. Cleaning and finishing processes for Al and Mg. (L12, L14, L26, Al, Mg)

402-L. Recent Developments in Primer Coatings. Allen G. Gray. *Products Finishing,* v. 14, June 1950, p. 100, 102, 104, 106, 108, 110, 112, 114.

Deals with structural steel shop coat priming paint. Test procedure, pigmentations, and vehicles; test results. (L26, CN)

403-L. Blast Cleaning Cuts Fabrication Cost. *Steel,* v. 126, June 12, 1950, p. 94.

Setup which simplifies Al coating and bonding steel refrigerator components. (L10, ST)

404-L. Sendzimir Process Broadens Galvanized Sheet Applications. K. Oganowski. *Steel,* v. 126, June 12, 1950, p. 102, 104, 107, 110, 113.

Previously abstracted from "Armco Takes Wraps Off Sendzimir Galvanizing Process," *Iron Age.* See item 391-L, 1950. (L16, Zn, ST)

405-L. Soft Grits for Blast Cleaning. *American Machinist,* v. 94, June 12, 1950, p. 127.

Grits prepared from corn cobs, nut shells and fruit pits, used in conventional sandblasting equipment for efficient removal of paint, dirt, grease, carbonaceous deposits and scale without impairing the surface or dimensions of metal workpieces. (L10)

406-L. Hard Facing Drill Pipe. Wayne Eastwood. *Industry & Welding,* v. 23, June 1950, p. 38-39.

Procedure used by Buck's Welding Works, Signal Hill, Calif. (L24, ST)

407-L. Chemical Treatment of Die Castings Contributes to High Quality Organic Finishes. *Die Castings,* v. 8, June 1950, p. 45-48.

Treatments for Zn castings include conversion of the surface to a compound, phosphating, producing chromium salts on surface, chromating, etc. Merits of each treatment. Also treatments for magnesium, copper, brass, and lead castings. 18 ref. (L14, Zn, Cu, Mg, Pb)

408-L. Galvanizing Water Tanks at Hotpoint. John Wallerius. *Iron Age,* v. 165, June 15, 1950, p. 110-112.

Accurate control of cleaning and fluxing operations and of the zinc dipping process. Effect of furnace design and heat distribution characteristics on surface finish and cost. (L16, ST, Zn)

409-L. New Pickler Operates Like an Automatic Clothes Washer. *Inco,* v. 24, Spring, 1950, p. 26-28.

Machine has a sequence of hot and cold washings, rinses, and acid baths. (L12)

410-L. A Rapid Immersion Silvering Method of High Efficiency. P. B. G. Upton and E. F. G. Herington. *Research,* v. 3, June 1950, p. 289-290.

Method of depositing a silver film by reduction of a silver ammionionitrate solution with hydrazine sulphate, where the deposition of silver other than on the desired surface is prevented by the presence of pyridine. Comparable results are obtained by using cyclohexylamine or ammonia instead of pyridine if a small cetyl pyridinium bromide is added. (L16, Ag)

411-L. Watch Your Surface Finish. Part I. *Steel,* v. 126, June 19, 1950, p. 88-90, 115-116.

General discussion of terminology, costs, etc. Surface-finish measuring instruments. (L15)

412-L. Phosphorus Alloys Used in New Plating Method. *Steel,* v. 126, June 19, 1950, p. 99, 102.

Bureau of Standard's new process for electrodepositing alloys of phosphorus with Co or Ni. Easily deposited, the alloys are hard, corrosion resistant, and bright. (L17, Co, Ni)

413-L. Distribution of Hydrogen in the Steel-Enamel System. H. M. Davis, J. H. Keeler, and P. K. Chu. *Better Enameling,* v. 21, June 1950, p. 6-7. (A condensation.)

It is concluded that the immediate source of the hydrogen causing delayed defects and reboiling blisters in enamel is the steel base and that the hydrogen was dissolved or occluded in the metal prior to or during the enamel-firing step. Experimental observations on low-carbon steel. (L27, N16, CN)

414-L. A Study of Gases in Porcelain Enamelling. P. K. Chu, J. H. Keeler, and H. M. Davis. *Better Enameling,* v. 21, June 1950, p. 8-11. (A condensation.)

Gas samples as small as 10^{-8} cc. were analyzed, and an enclosed system was devised wherein an isolated enamel or an enamel with steel could be heated for the study of reactions and gas extraction. (L27, S11, CN)

415-L. An Examination of Reboiling. J. H. Keeler, P. K. Chu, and H. M. Davis. *Better Enameling,* v. 21, June 1950, p. 12-14. (A condensation.)

Reboiling is defined as a sudden appearance of blisters on the surface of ground coats, on sheet enameling iron, that may take place during the heating period on second or subsequent firing, the blisters disappearing again as the time of firing is extended. A temperature of 750° C. was used for the tests, and a commercial blue ground coat as the standard coating material. Various enamels were tested with a low-metalloid rimmed steel. (L27, CN)

416-L. Trouble Shootin'. John L. McLaughlin. *Better Enameling,* v. 21, June 1950, p. 36-37.

Causes of reduced acid resistance and ways to improve acid resistance. Final installment of series on porcelain-enamel defects. (L27)

417-L. Electroplating of Wearing Parts. T. R. Boggess. *Railway Mechanical and Electrical Engineer,* v. 124, June 1950, p. 333-336.

Hard chromium plating of bearings, pistons, nozzles, wrist pins, crosshead guides, sealing rings, cylinder liners, hydraulic parts, valve shafts, gages, pumps, crankpin collars, gears, tools, etc., in the Norfolk and Western's Roanoke, Va., shops. (L17, T23, Cr)

418-L. Hydrogen Embrittlement in Nickel, Tin, and Lead Electroplating. C. A. Zapffe and M. E. Haslem. *Plating,* v. 37, June 1950, p. 610-613.

Quantitative measurements are reported for brittleness of mild-steel and low-carbon stainless-steel wires electroplated with Ni, Sn, Pb. Typical baths provided data for an evaluation of the scope of common hydrogen problems, such as brittleness and blistering, likely to be encountered. The standardized procedure used permits the comparison of a number of Cr, Cd, Zn, Cu, Ni, Sn, and Pb plating processes. (L17, Q23, Ni, Pb, Sn, CN, SS)

419-L. Low Cost Finishing With Roto-Finish. C. H. Castle. *Plating,* v. 37, June 1950, p. 615-617, 633.

Fundamental features of Roto-Finish wet tumbling method. Various processes, parts to be finished, equipment, operating variables, precautions, separation of parts, special applications, and limitations. (L10)

420-L. Razor Manufacture: A Boston Industry. *Plating,* v. 37, June 1950, p. 625-629.

Plating at the Gillette Safety Razor Co., using three automatic plating machines: one each for bright Ni, Au, and bright Ni and Au. The base metal throughout is copper or brass. (L17, Au, Ni, Cu)

421-L. Application of Wear Resistant Phosphate Coatings to Ferrous Surfaces. M. B. Roosa. *Lubrication Engineering,* v. 6, June 1950, p. 117-120; discussion, p. 120-121.

Functions, qualities, and method of application and relation to production practices. Material includes automotive, aircraft, and diesel engine parts made of steel and cast iron. (L14, T25, CI, AY)

422-L. Base Metals for Porcelain Enamels. W. A. Deringer. *Ceramic Industry,* v. 54, May 1950, p. 56-59; June 1950, p. 72-75, 116,119.

Compositions, properties, enameling property tests, and production. Effect of welding. Deals with enameling iron, low-carbon steel, or Ti-bearing enameling iron. 14 ref. (L27, CI, CN)

423-L. Electroplating History. *Metal Industry,* v. 76, June 2, 1950, p. 437-438.

Heated solutions, speed of deposition, research work, and proposed formation of Australian Electrodepositors' Society. (L17)

424-L. (Book) Electroplating. A. H. Sanders. 118 pages. 1950. International Textbook Co., Scranton, Pa.

Material is presented from both the practical and scientific viewpoint. Covers basic theory and laws, reversible and standard electrode potentials, electrodeposition of metals, electroplating practice, power supply, and plating for the hobbyist. (L17)

425-L. Fitting Hard Chromium Plating to the Job. Gilbert C. Close. *Steel Processing,* v. 36, June 1950, p. 281-284.

The various physical and chemical properties of electrodeposited Cr and the value of these properties in certain industrial applications. Describes typical uses as a general guide to design and production engineers. (L17, T general, Cr)

426-L. Applications of Corrosion Resistant Coatings. C. M. Jekot. *Organic Finishing,* v. 11, June 1950, p. 14-17.

As applied to vessel linings in the food, beverage, chemical, and transportation industry. (L26, T29)

427-L. Metal Powder Parts Successfully Plated by New Process. Jerome F. Kuzmick. *Materials & Methods,* v. 31, June 1950, p. 54-56.

Use of heat treatment to remove residual plating salts as a means

of eliminating "spotting-out" defect encountered in electroplating porous-metal compacts. Process, known as Etolizing, has been successfully applied to coating of porous iron, brass, and bronze with Cu, Ni, Ag, Cu-Ni, and Cu-Sn, also Cr under certain conditions. (L17, Fe, Cu)

428-L. Automatic Finishing of Air-Way Sanitizors. F. H. Burmeister. *Industrial Finishing,* v. 26, June 1950, p. 18-20, 22.

How die-cast and sheet-metal parts for vacuum cleaners are cleaned, spray painted with hammered-effect finish, and baked in a conveyerized setup. (L26)

429-L. Painting Aluminum Parts for KoolVent Awnings. Walter Rudolph. *Industrial Finishing,* v. 26, June 1950, p. 24-26, 28.

Production cleaning, surface treatign, drying, spray painting, and baking. (L26, Al)

430-L. Color Litho Process for Steel Drums. *Industrial Finishing,* v. 26 June 1950, p. 29-30.

Process which prints up to four colors on heavy-gage steel which later is formed into shipping drums. (L26, CN)

431-L. Reconditioning and Refinishing the Navy's Al Alloy Airplane Propellers. Howard E. Jackson. *Industrial Finishing,* v. 26, June 1950, p. 32-34, 36, 38, 40.

Removing paint, filing, grinding and buffing blades to remove all pitting; cleaning metal surfaces; spray painting blades in black; and applying yellow markings. (L26, L10, T24, Al)

432-L. 55-Gallon Drums Now Lithographed. *Modern Lithography,* v. 18, June 1950, p. 28-30; **Lithographing—75 Ton Per Hour.** *National Lithographer,* v. 57, June 1950, p. 36, 89.

New process and equipment. (L26, T26, ST)

433-L. Flame Spraying of Plastics on Metals. J. A. Neumann. *Industry & Welding,* v. 23, July 1950, p. 36-39, 54-55.

(L26)

434-L. Modern Composite Metals. Sidney Siegel. *Journal of Metals,* v. 188, July 1950, p. 916-920.

Fundamental theories and commercial methods for production of clad metals or bimetallic sheets, in which dissimilar metal layers are caused to form continuous metallic bonds. (L22)

435-L. Immersion Tube Heating of Water and Solutions. II. (Concluded.) Maurice J. Dewey. *Industrial Heating,* v. 17, June 1950, p. 1002, 1004, 1006, 1008.

Design of immersion-heating surfaces, fabrication of immersion tubes for various surfaces, safety controls, and heating of plating solutions. (L17)

436-L. Combination Spray Booth-Dryer Speeds Refinishing of Railroad Rolling Stock in the Shops of the Chicago, Rock Island & Pacific Railroad. *Industrial Heating,* v. 17, June 1950, p. 1042-1044, 1046, 1048-1051.

Same units serve as spray booths and bake ovens. (L26, T23)

437-L. Electroplating. C. L. Faust and W. H. Safranek. "Encyclopedia of Chemical Technology". Vol. 5, 1950 (Interscience Encyclopedia, Inc., New York), p. 611-646.

A descriptive review. 115 ref. (L17)

438-L. Hardfacing. N. H. Cuke. *Canadian Metals,* v. 13, June 1950, p. 39-41.

The various types of alloys used, and their applicabilities to different jobs. (L24, SG-m)

439-L. Surface Treatment and Finishing of Light Metals: Part 5. (Continued.) S. Wernick and R. Pinner. *Sheet Metal Industries,* v. 27, June 1950, 553-557.

Chemical-oxidation treatments for tubes; phosphate process, and bonderizing. Compares chemical oxide conversion coatings. 109 ref. (L14, Al)

440-L. Vitreous Enamelling of Light Alloys. R. P. Fraser, A. L. Cianchi, and J. M. Connor. *Foundry Trade Journal,* v. 88, June 1, 1950, p. 591-598.

See abstract from *Sheet Metal Industries,* item 372-L, 1950. (L27, Al)

441-L. Gas-Pickling of Steel. J. Pearson, W. Bullough, and T. C. Canning. *Journal of the Iron and Steel Institute,* v. 165, June 1950, p. 185-190.

Treatment of steel strip in atmospheres containing gaseous HCl has been practiced in the U. S. for preparing the material for subsequent hot galvanizing. Laboratory investigations confirmed the fact that galvanized coatings adhere more tightly to steel prepared in this way than to steel pickled in aqueous H_2SO_4. The process is, however, suitable only for steel which can be heated to temperatures of about 750° C. without loss of required properties. (L12, L16, CN)

442-L. Mechanical Giant Plates Chrome on Stainless. H. E. Head. *Iron Age,* v. 165, June 29, 1950, p. 65-68.

Straight-line, mass-production techniques at Briggs which make possible production of 3000 complex welded and Cr-plated, stainless steel assemblies per day. Features include

polishing prior to forming and use of the world's largest automatic machine for the plating process. (L17, Cr, SS)

443-L. Plastic Coated Steel Resists Corrosion. *Iron Age,* v. 165, June 29, 1950, p. 71.

Use of vinyl plastic as a protective coating for steel exposed to underwater corrosion. Tests show effectiveness. (L26, ST)

444-L. Electroplated Phosphorus Alloys Give Hard Coat. *Iron Age,* v. 165, June 29, 1950, p. 78.

Commercial method developed by National Bureau of Standards for producing electrodeposits of Co or Ni alloyed with 15% P. (L17, Co, Ni)

445-L. Diaphragm Tanks Promote Plating Progress. Ezra A. Blount. *Products Finishing,* v. 14, July 1950, p. 12-24.

Diaphragm tanks are used for elimination of deposit roughness and improvement of deposit quality in high-speed cyanide Cu-plating solutions. The same principle can also be applied to other plating solutions such as silver, brass, zinc, cadmium, and particularly bright nickel. (L17)

446-L. Belt Polishing and Dip Finishing Door Chimes. William R. Cutter. *Products Finishing,* v. 14, July 1950, p. 28-32, 34.

Equipment and procedures of NuTone, Inc. Chimes are made from seamless brass tubing. (L16, L10, Cu)

447-L. Spotlighting Finishing Progress. Allen G. Gray. *Products Finishing,* v. 14, July 1950, p. 50, 52, 54, 56, 58, 60, 62, 64, 68, 70, 72.

Under the heading, "Factors Affecting the Adhesion of Organic Coatings", a recent paper by Charles J. Marsel is thoroughly reviewed. Includes surface preparation for good adhesion and methods for evaluation of adhesion of organic coatings. Under "Passivity in Chromium Plating Operations", a paper by R. O. Hull and J. B. Winters is briefly outlined. Recommendations for avoidance of production losses due to passivity when plating chromium over nickel. (L17, L26, Ni, Cr)

448-L. Infra-Red Oven Removes Grease From Floor Furnace Parts. *Products Finishing,* v. 14, July 1950, p. 74, 76.

Improved method for degreasing sheet-metal parts used in the manufacture of floor furnaces. (L12)

449-L. How Briggs Chrome Plates Stainless Assemblies. Herbert E. Head. *Steel,* v. 127, July 3, 1950, p. 82-84.

Equipment and procedures applied by Briggs Mfg. Co. to decorative trim for automobiles. (L17, T21, Cr, SS)

450-L. Induction Furnace Cuts Zinc Loss. Edward W. Burd. *Steel,* v. 127, July 3, 1950, p. 88-90, 92.

How application of low-frequency electric induction principles to production galvanizing holds metal loss to a small fraction of previous loss patterns and concentrates great working capacity in a small area. (L17)

451-L. Nickel Immersion Coatings by Electrochemical Displacement and by Chemical Reduction. W. A. Wesley. *Plating,* v. 37, July 1950, p. 732-734, 756.

Processes and properties of the deposits. Presents unbiased comparison with electrodeposited coatings. Surveys potential applications. (L16, Ni)

452-L. Determination of Free Cyanide and Ammonia in Brass and Bronze Plating Baths. Part II. Experimental Evaluation of Present Methods and Recommended Procedures for Free Cyanide Determination. Samuel Heiman. *Plating,* v. 37, July 1950, p. 745-748, 756.

(To be continued.)
(L17, S11, Cu)

453-L. Porosity of Electrodeposited Metals. VIII. Loss of Weight, Increase of Permeability, and Failure of Electrodeposited Coatings. IX. The Effect of Certain Aromatic Polysulfonates on the Permeability and Corrodibility of Electrodeposited Nickel Foils. N. Thon, Ling Yang, and Denis Keleman. *Plating,* v. 37, July 1950, p. 749-753.

Results of experimental investigation of deep and surface corrosion, corrosion through coatings, mechanism of corrosion, etc., of electrodeposited Ni on Fe, using various baths and thicknesses. Ni foils produced in standard Watts baths with and without above addition agents were tested for corrodibility and permeability. All four of the agents resulted in increased corrodibility in an atmosphere saturated with HCl vapor. (L17, R1, Ni)

454-L. A Rust-Preventing Pickling Inhibitor. Karl F. Hager and Morris Rosenthal. *Corrosion* (Technical Section), v. 6, July 1950, p. 225-231.

Use of "Emulphor STH", a wetting agent which belongs to a new class of pickling inhibitors and which gives excellent metal-surface protection against H_2SO_4 attack without altering the rate of acid attack against the oxide appreciably. It also shows excellent adhesion to the metal surface so that "after-

treatment" may be delayed several days without rerusting of the metal. Properties of inorganic and organic inhibitors. (L12, Fe)

455-L. Theory of the Electrodeposition of Metals From Aqueous Solutions. Colin G. Fink. *Science,* v. 112, July 7, 1950, p. 12.

Summarizes six means for control of thickness of the active cathode surface layer, necessary for satisfactory metal deposition. (L17)

456-L. Plating of Stainless Steel. Joseph Haas. *Ameircan Machinist,* v. 94, July 10, 1950, p. 125, 127.

Methods, recommendations, and patents. (L17, SS)

457-L. Vinyl Finishes for Aluminium Alloys. W. A. Edwards. *Light Metals,* v. 13, June 1950, p. 336-339.

Tests on a new type of stoving lacquer of superior mechanical and surface-protecting properties. Ease and economy of application. (L26, Al)

458-L. From a Metallurgist's Notebook: Chromating. H. H. Symonds. *Metal Industry,* v. 76, June 23, 1950, p. 490.

Experiments carried out to ascertain the cause of the inconsistent response to chromating of zinc-base die castings. (L14, Zn)

459-L. The Engineering Implications and Economics of Surface Preparation of Mild Steel Prior to Fabrication. W. A. Johnson. *Institution of Mechanical Engineers, Proceedings,* v. 162, no. 1, 1950, p. 49-56; discussion, p. 56-65.

See abstract of condensed version in *Engineer,* item 7B-245, 1949. (L26, T26, CN)

460-L. Application of Electropolishing to Study of the Chromizing of Steels. (In French.) P. Galmiche. *Métaux & Corrosion,* v. 25, Mar. 1950, p. 65-66.

According to the method described, the exact amount of Cr in the chromized layer may be determined by means of its removal by electropolishing accompanied by X-ray diffraction analysis. (L15)

461-L. Electropolishing and Vacuum Technique. (In French.) Pierre Nineuil. *Vide,* v. 5, May 1950, p. 807-813.

Principles of electropolishing and its application to the finishing of structural parts of electron tubes. The technique used. (L13, T1)

462-L. Effect of Inhibitors on the Acid Pickling of Steel. Part I. (In Polish.) M. Smialowski and J. Foryst. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 1, no. 2, 1949, p. 147-153.

Experiments to determine the inhibition efficiency of dibenzylsulfide, dibenzylsulfoxide and thiocarbanilide in the acid pickling of iron, steel, and other metals. Results show that the action of inhibitors is more chemisorption than pure physical sorption, and that this phenomenon is related to the ability of some metals (particularly Ni, Co and Fe) to become passive. 11 ref. (L12, ST, Fe)

463-L. Anodic Process During Electropolishing of Copper in a Solution of Orthophosphoric Acid. (In Russian.) K. P. Batashev and E. N. Nikitin. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 23, Mar. 1950, p. 263-270.

Analysis of the products of anodic solution indicated that the secondary copper phosphate is formed in the initial stage of electropolishing and the tertiary in the final stage. Mechanism of electropolishing is explained in accordance with the shape of the potential curves obtained. Thermodynamically calculated static potentials of Cu in solutions of its phosphates are confirmed experimentally. 10 ref. (L13, Cu)

464-L. "Agate" Chromium Plating. (In Russian.) V. T. Safron'ev. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Mar. 1950, p. 21.

Method of obtaining an "agate-chromium" finish on metal (steel, bronze, copper, brass, silver, or alloy steel). This is a beautiful, decorative figured pattern giving the part the appearance not of a metal, but of a mineral similar to polished agate or jade. Corrosion resistance of the finish is good. (L17, Cr)

465-L. How Aircraft Engine Parts Are Barrel Finished. Dudley J. Kaharl. *Iron Age,* v. 166, July 13, 1950, p. 81-83.

Methods applied to Al and steel parts by Pratt & Whitney Aircraft Div. (L10, ST, Al)

466-L. Acid Baths Offer Electroplating Advantages. J. B. Moller. *Iron Age,* v. 166, July 13, 1950, p. 92-95.

Though there are only a few practical acid electroplating baths, their use with small amounts of noble metal addition agents creates many new alloy compositions and permits new control methods. Acid plating solutions operate at higher anode and cathode efficiencies than do alkaline baths. They are not subject to typical alkaline decomposition. (L17)

467-L. Metal Spraying of High-Temperature Metals and Alloys. Robert

T. Thurston and John Wulff. *Welding Journal,* v. 29, July 1950, p. 313s-319s.

Hydrostatic-bursting technique developed to measure the strength of sprayed deposits. With this technique, a relationship was shown to exist between oxide content and strength of sprayed metal. Sintering of sprayed-metal deposits in hydrogen, especially in the presence of a liquid phase, was successfully accomplished, resulting in significant increases in density and bursting strength. The materials investigated were Mo, Ni, Mo-Ni alloys, Hastelloy C, Vitallium, and CM-469 (60% Cr, 25% Mo, and 15% Fe.)
(L23, SG-h, Mo, Ni, Co, Cr)

468-L. Determination of the Temperature of Sprayed Metal Particles. James E. Cline, Robert T. Thurston, and John Wulff. *Welding Journal,* v. 29, July 1950, p. 320s-322s, 342s.

Development of thermocouple and colorimeter technique for determining the heat content and temperature of sprayed metal particles at the moment of impact. The investigation includes tests made with Zn, Al, Cu, Ni, Fe, and Mo. Results indicate that the metal particles are at their melting point at impingement. Calculations show that the contribution of kinetic energy is negligible. (L23, S16)

469-L. The Anode Layer in the Electrolytic Polishing of Copper. H. F. Walton. *Journal of the Electrochemical Society,* v. 97, July 1950, p. 219-226.

Viscosities and electrical conductivities of solutions of $CuHPO_4$ in aqueous phosphoric acid and phosphoric acid-glycerol-ethylene glycol mixtures were measured as an aid in investigating the anode layer formed when Cu is electropolished in these solutions. Cu concentrations near the anode during electrolysis were measured, and current-voltage relationships were studied using a rotating Cu anode. Effective thickness of the anode layer was estimated to be about 10^{-3} cm. 18 ref. (L13, Cu)

470-L. Gold-Plated Electrode for Measurement of Conductance of Electrolytes. Sidney Barnartt. *Journal of the Electrochemical Society,* v. 97, July 1950, p. 235-236.

Electrodes for conductance measurements by the Kohlrausch method were prepared by electrodepositing finely divided gold over a layer of smooth gold. Their behavior was studied over the frequency range 1-10 kc. per sec. Polarization resistance was found to be relatively small and in conformity with the Warburg relationship. 11 ref. (L17)

471-L. Metal Coatings on Ceramic Bodies; and Joining Ceramic Objects With Each Other, With Metal, or With Glass. (In German.) Hans J. Karmaus. *Sprechsaal für Keramik; Glas; Email,* v. 83, Apr. 20, 1950, p. 141-145.

Various methods are described in considerable detail. (L general, K11)

472-L. Effects of Metallurgical Conditions on the Enameling of Cast Iron. (In German.) A. Königer. *Neue Giesserei,* v. 37 (new ser., v. 3), Apr. 6, 1950, p. 125-136; Apr. 20, 1950, p. 148-157; May 4, 1950, p. 168-176.

Various types of defects in enameled surfaces. Properties of cast iron and its preliminary treatment as causes of such defects were investigated. Experiments on effects of iron composition and preliminary treatment. Final installment: Effects of surface-layer composition and of sulfur from the molding sand on the enameled surface. The necessity of reducing the S content of the melt, or of melting at a high temperature in order to prevent precipitation of sulfide crystals before pouring. 18 ref. (L27, E11, CI)

473-L. Bimetallic Contacts. (In German.) H. Kalpers. *Metall,* v. 4, May 1950, p. 193-195.

Contacts consist of base metals plated with nobler metals by mechanical means (as rolling) at elevated temperatures. Different types of bimetals, the effect of rolling on their hardness, and their economic and technical advantages. Special problems such as bending, embossing, drawing, and riveting.
(L22, F23, SG-r)

474-L. (Book) **Industrial Electrochemistry.** Ed. 3. Charles Letman Mantell, 781 pages. 1950. McGraw-Hill, 330 West 42nd St., New York 18.

Theoretical and technical electrochemistry, electrolytics, electrothermics, electrochemistry of gases, and engineering. Various types of processes, their applications and products, equipment and methods for each, and a large amount of technical and operating data. Footnote references. (L17, C23, P15)

475-L. (Book) **Metal Finishing Handbook.** P. A. Cartwright. 216 pages. 1950. Blackie and Son, Ltd., 66 Chandos Place, London, W.C. 2, England.

Processes used in providing permanent metal-protective finishes. Pretreatment of metal surfaces by grinding, polishing, burnishing, chemical cleaning, pickling, scratch-brushing, and stripping. Electroplating, and the electrodeposition of metals such as nickel, copper, chro-

mium, cadmium, zinc, lead, etc., also decorative plating processes. Metal coloring by bronzing, oxidizing, blueing, lacquering, coloring of silver, gold, tin, nickel, aluminum, etc. Brief description of phosphate and allied coatings. Testing of coatings for adhesion, thickness, porosity, and corrosion resistance. (L general)

476-L. New Materials and Techniques Covered at AES Convention. *Iron Age,* v. 166, July 20, 1950, p. 97-100.

Summary of proceedings of 37th Annual AES Convention and 4th International Electrodeposition Conference, Boston. (L17)

477-L. Tin Plate Cleaning and Annealing Cycle May Be Cut to Less Than Two Days. Alfred E. Kadell. *Steel,* v. 127, July 24, 1950, p. 72.

Continuous method which will permit tremendous reduction of in-process inventory and closer control of physical properties and surface conditions of the steel. (L12, J23, ST)

478-L. The Production of Home Freezers. Arthur Q. Smith. *Industrial Gas,* v. 29, July 1950, p. 3-5, 24.

Sheet forming and enamel finishing using gas-fired equipment. (L27, G3, CN)

479-L. Tougher Coatings for a Tough Job. J. E. Kastrop. *Bakelite Review,* v. 22, July 1950, p. 12-15.

Condensed from "Plastics Combat Well-Head Corrosion", *World Oil,* item 256-L, 1950. (L26, R4)

480-L. Production Painting of Steel Drums. Seymour Schlein. *Industrial Finishing,* v. 26, July 1950, p. 24-26, 28, 30, 32.

Procedures and equipment at Cleveland Steel Barrel Co. (L26, ST)

481-L. Blast Cleaning Metal Parts. *Industrial Finishing,* v. 26, July 1950, p. 34-36.

Procedures employed by Servel, Inc., Evansville, Ind. Steel coils are prepared for application of Al coatings. (L10, ST)

482-L. Health Hazards in Metal Degreasing. Paul W. McDaniel. *Metal Progress,* v. 58, July 1950, p. 77-78, 102, 104, 106, 108-109, 111.

As applied to alkaline, acid, and solvent cleaning. (L12, A7)

483-L. Installation & Operation of a High Speed Nickel Solution for Repetition Plating. C. W. J. Morley. *Electroplating and Metal Finishing,* v. 3, July 1950, p. 400-404.

Solution for repetition plating of semi-bright Ni. Details of proper temperatures, steam heating, agitation, filtration, removal of impurities, voltages, anodes, and technical control. (L17, Ni)

484-L. Electrolytic Polishing in Cyanide Solutions. *Electroplating and Metal Finishing,* v. 3, July 1950, p. 415-416.

Conditions for satisfactory polishing of Ag, Cu, Cd indicated in a new patent specification of Arthur D. Little, Inc. (L13, Ag, Cu, Cd)

485-L. Bright Deposits From Sulphate Copper Electrolytes. *Electroplating and Metal Finishing,* v. 3, July 1950, p. 417-418.

Recently published British patent granted to General Motors Corp. It is claimed that brilliant Cu deposits. (L17, Cu)

486-L. Gold Plating Nickel Dental Clips. *Electroplating and Metal Finishing,* v. 3, July 1950, p. 427.

Specifications of recent French patent. (L17, Ni, Au)

487-L. Salt Baths Perform Variety of Cleaning Jobs on Most Metals. John B. Campbell. *Materials & Methods,* v. 32, July 1950, p. 60-64.

Advantages, limitations, applications, and some case histories of non-electrolytic salt baths. (L12)

488-L. Wrinkle Finishes Provide Attractive Durable Coatings. W. A. Waldie. *Materials & Methods,* v. 32, July 1950, p. 65-67.

Various types, their uses, and methods of application. (L26)

489-L. Cyclic Phenomena Observed in Electropolishing of Silver. Howard T. Frances and William H. Colner. *Journal of the Electrochemical Society,* v. 97, Aug. 1950, p. 237-240.

A study was made of the anodic electropolishing of silver in a standard cyanide plating bath. The current flowing in such a cell, under certain circumstances, shows repeating fluctuations. Frequency of this cyclic effect is due to the anodic portion of the cell, and is markedly dependent on the stability of the d.c. source used. Best polishing is obtained at the highest frequencies. (L13, Ag)

490-L. Electrolytic Hexagonal Nickel. Ling Yang. *Journal of the Electrochemical Society,* v. 97, Aug. 1950, p. 241-244.

Conditions governing formation of the above in baths containing $NiCl_2$, $NiSO_4$, and H_3BO_3. A mixed structure of face-centered cubic and hexagonal close-packed forms was always present in deposits made from baths containing a relatively large amount of $NiCl_2;6H_2O$ at higher current densities and lower bath temperatures. Deposits with a mixed

structure were found to contain more occluded hydrogen than those with a simple face-centered-cubic structure. Possible connection between higher hydrogen content and presence of the mixed structure under certain bath conditions. 13 ref. (L17, Ni)

491-L. Some Aspects of Adhesion. E. S. Beck. *Organic Finishing,* v. 11, July 1950, p. 8-11, 16.

Cohesion vs. adhesion; types of adhesion; priming metal surfaces; and finishing factors affecting adhesion. (L general)

492-L. Production Finishing of Automotive Parts. *Organic Finishing,* v. 11, July 1950, p. 12-13.

Refers to enamel and lacquer coatings. (L26, T21)

493-L. Plating Range Tests Improve Plating Baths. J. B. Mohler. *Iron Age,* v. 166, July 27, 1950, p. 63-67.

How optimum plating conditions under continuous operation can be achieved by periodic plating-range tests, under conditions in which chemical analysis alone is insufficient. Details of procedures and equipment. (L17)

494-L. A Survey of the Application and Performance of Temporary Rust Preventives. G. T. Dunkley. *Sheet Metal Industries,* v. 27, July 1950, p. 599-604, 606.

Performance of various types, mainly in West Africa and New Guinea. (L14, L26, Fe)

495-L. Some Aspects of Corrosion Prevention in Practice. W. Montgomery. *Sheet Metal Industries,* v. 27, July 1950, p. 643-653.

General principles: the "Barffing" process (formation of protective oxide coating on iron and steel by reaction with steam at red heat); vitreous enameling, including various types of defects; testing permeability of enamels; and galvanizing. (L14, L16, L27, Fe)

496-L. High Temperature Refractories Discussed at Electrochemical Society Meeting. *Steel,* v. 127, July 31, 1950, p. 78, 81-82.

Recent developments in refractories that will withstand 4000° F. and higher; how Cr improves oxidation resistance of TiC; protective coatings for Mo; vapor deposition of refractory coatings; improved Pd-plating bath; new heat resistant protective coatings; and corrosion of composite plated coatings. (L27, B19)

497-L. Plastics Meet the Acid Test. Raymond B. Seymour. *Modern Plastics,* v. 27, Aug. 1950, p. 91-92, 94, 96, 98, 148, 150.

Presents extensive review of literature on resistance to attack by various chemicals of different types of plastics used as protective coatings, linings, corrosion resistant cements, and other materials. 189 ref. (L26)

498-L. World's Fastest Tinplating. J. A. Jones and W. R. Huey. *Du Pont Magazine,* v. 44, Aug.-Sept. 1950, p. 14-15.

Procedures and equipment of Weirton Steel Co. Speeds of 2000 ft. per min. are possible for the electrolytic plating of tin by use of a halogen solution developed by Du Pont. (L17, CN, Sn)

499-L. Some Aspects of Flame Spraying by the Powder Process. James N. Blake. *Engineering & Chemical Digest,* v. 2, May 1950, p. 158-163. Condensed from *Transactions of the Institution of Chemical Engineers in Charge,* v. 54, no. 8.

The Schoop powder pistol and associated equipment; and its application to deposition of Zn, Al, Pb, Sn, Cu, bronze, plastics, synthetic rubbers, sulfur and wax. Compares method with others for depositing zinc. (L23, Zn, Al, Pb, Sn, Cu)

500-L. New Developments in Porcelain Enameling. Burnham W. King. *Finish,* v. 7, Aug. 1950, p. 32-35.

Includes the "pros and cons" of low-temperature enamels and the outlook for color. (L27)

501-L. Drums Formed and Welded After Litnograpning. *Sheet Metal Worker,* v. 41, July 1950, p. 52.

Process in use by Rheem Mfg. Co. (L26, CN)

502-L. A Rapid Method of Immersion Silvering; Pre-Treatment With Stannous Chloride. *Chemical Age,* v. 63, July 1, 1950, p. 14, 17.

Pretreatment with $SnCl_2$ resulted in great improvement of the silvering process using a 1% ammoniacal solution with 10-15% pyridine and addition of hydrazine sulfate to reduce the silver salt. In contrast to the usual process, little silver was precipitated on the walls of the vessel. A surface-active agent was required when very pure pyridine was used, hence it was discovered that other bases—NH_3 or cyclohexylamine—could be used in the presence of the surface-active agent. (L16, Ag)

503-L. Influence of Various Additions to Hard Chromium Plating Baths on Character of the Chromium Deposit. (In Czech.) J. Doskar. *Hutnicke Listy,* v. 5, May 1950, p. 197-201.

Experimental results obtained with various additions. Microstructures of the deposits and their characteristics. (L17, Cr)

504-L. Anodic Oxidation of Metals With Different Surface Textures. (In Russian.) G. S. Vozdvizhenskii, A. Sh. Valeev, and T. N. Grechukhina. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 72, May 11, 1950, p. 311-313.

Influence of the surface condition of 99.5% Al following different surface treatments (abrasive-paper polishing, mechanical polishing, or electropolishing) on microstructure after anodic oxidation. Differences in porosity between sections parallel and perpendicular to the direction of working. (L19, Al)

505-L. Determination of Quantity of Heat Released by the Current Flow in Electrolytic Baths. (In Russian.) L. I. Antropov. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 23, Apr. 1950, p. 375-379.

Different methods of calculating the Lentz-Joule heat of electrolytic baths. Indicates sources of error inherent in usual approximate methods and attempts to formulate a more accurate method. (L17)

506-L. Electrodeposition of High-Tin Bronzes. (In Russian.) N. P. Fedot'ev, N. M. Vyacheslavov, and E. I. Orlova. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 23, Apr. 1950, p. 380-384.

Experimental investigation indicates that speculum plating may be obtained by using a Cu stannate bath of the following composition: Sn, 45-60; Cu, 10-15; NaOH, 25-30; and KCN, 10-15 g. per. l. Optimum electrical conditions were also determined. (L17, Cu)

507-L. Protective and Decorative Film on Iron and Steel Produced by Means of Oxalate Containing Small Amount of Phosphate. (In Japanese.) Hikozo Endo and Ichiro Nihei. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Dec. 1949, p. 27-28.

Research was carried out in order to utilize the aqueous solution and precipitation of hydrophosphate (containing Zn, Mn and Fe), which decreased the activity of film formation. It was found that the above precipitate can be re-used as a rust preventative by addition of a hot solution of 2-3% oxalic acid. The film thus formed can be used as a base for paint or other coatings. (L14, Fe, ST)

508-L. Evaluation of Organic Coatings by Electrographic Printing. Max Kronstein, Marion M. Ward, and Robert Roper. *Industrial and Engineering Chemistry,* v. 42, Aug. 1950, p. 1568-1572.

Application of the electrographic printing method for the detection of permeability and under-film spreading of moisture of organic coatings gives new means for the rapid evaluation of these coatings under many conditions and in conjunction with many of the usual test methods. The method has been used successfully over a period of nearly 3 years in the development and evaluation of new coatings and modification of commercial coatings. (L26, R11)

509-L. Corrosion in a Large Invert Sugar Tank. H. W. Foelsch. *Corrosion* (News Section), v. 6, Aug. 1950, p. 1.

Illustrations show superiority of phenolic-resin coating over a pigmented phenolic paint for interior surfaces of sugar tank. Lining procedure. (L26, ST)

510-L. Recommended Practices for Surface Preparation of Steel: TP-6G—Surface Preparation for Organic Coatings. *Corrosion* (Technical Section) v. 6, Aug. 1950, p. 276-282.

First Interim Report of NACE Technical Practices Committee. (L26, ST)

511-L. Plating Zinc Base Die Castings. *Die Castings,* v. 8, Aug. 1950, p. 37-39, 41-42, 63.

Surveys recent literature, including chemical cleaning before plating. (L17, Zn)

512-L. Bonding Aluminum to Ferrous Alloys. M. V. Little. *Machinery* (American), v. 56, Aug. 1950, p. 173-177.

"Al-Fin" process in which pure Al and its alloys are molecularly bonded to iron and steel. Preselected physical properties of both metals are combined in such bi-metallic components. The process consists essentially of casting molten Al alloy around a specially prepared ferrous surface. Structure of bonds is illustrated by photomicrographs. (L22, Al, ST)

513-L. Electroforming. *Product Engineering,* v. 21, Aug. 1950, p. 145-147.

Recent improvements which have put this process on a mass-production basis. Tubular and cup-shaped parts having special contours otherwise impractical to form can now be produced in quantity. Metallic coating of plastics, forming of precision dies, joining of small components, and production of limited quantities of parts for product development are other applications. (L18)

514-L. Wetting Properties of Some Enamel Glasses and Relation to Impact Resistance. W. J. Knapp, C. C. Shah, and T. J. Planje. *Journal of the American Ceramic Society,* v. 33, Aug. 1, 1950, p. 258-262.

Wetting properties on commercially pure enameling iron were determined and compared with correlated impact-resistance test results. Rate of change of wetting characteristics with temperature seemed to influence impact resistance of the enameled metal. 31 ref. (L27, P10, Fe)

515-L. The Role of Spray Pickling in Porcelain Enameling. Jason W. Zander. *Better Enameling,* v. 21, Aug. 1950, p. 6-7, 31.

The process, its advantages and disadvantages. (L12, L27, CN)

516-L. Silver Alloy Cladding Cuts Brazing Costs. *Steel,* v. 127, Aug. 7, 1950, p. 111.

New development applicable to nonferrous products incorporating hollow handles, hidden joints, seamed tubes and irregularly shaped parts, springs, studs. Such materials as copper, most types of brass, nickel silver, jewelers' bronze, beryllium copper, cupro-nickel, nickel, monel, may be clad on one or both sides by the process, known as Braze-Clad. (L22, K8, Ag)

517-L. (Book) **Jahrbuch Der Galvano-Technik, 1950.** (Plating Technology Yearbook, 1950.) Oskar P. Kramer, editor. 300 pages. 1950. Metall-Verlag, G.m.b.H, Berlin W.15, Germany. 5.40 DM.

A comprehensive survey of the most recent advances in the various processes for combatting corrosion. Theoretical bases and practical processes of electroplating. Faults, corrective measures, bath supervision, tests on the coating, and the more important chemicals. Protection of light-metal and Zn surfaces, electrolytic polishing, hard chromium plating, phosphating and metal spraying, also protective varnish and acid-resistant coatings. (L17)

518-L. Recent Developments in Metallizing. *Machine and Tool Blue Book,* v. 46, Sept. 1950, p. 71-76.

Three important advances in this process are: Discovery of an alloy which bonds itself to the base material; a metallizing unit which operates on a smaller volume of air; and introduction of a glass flow meter. The alloy undercoat is one containing a high percentage of Mo. It can be sprayed on all common steels, stainless steels up to 12% Cr, monel, Ni, Cr-Ni alloys, cast iron and steel, most Al alloys and Mg. It also bonds fairly well to other materials including glass and ceramics. (L23)

519-L. Salt Bath Cleaning of Gray Iron Castings. Robert H. Herrmann. *Foundry,* v. 78, Aug. 1950, p. 90-91, 204-205.

Continuous process used by Chevrolet-Cleveland Div., General Motors Corp. The castings are normalized and cleaned in a continuous, automatic operation by conveying them through a furnace and a series of baths, including molten caustic, acid, water, and oil. (L12, J2, CI)

520-L. Titanium Parlay Wins for Westinghouse. *Ceramic Industry,* v. 55, Aug. 1950, p. 50-54, 57, 94.

Experiments on range platforms proved worth of one-coat processes, and were followed by adoption of the method for standard production. Inert steel and thin coatings combined to reduce production and shipping costs on electric ranges. Procedures and equipment. (L27, ST)

521-L. The Strength and Ductility of Electro-Deposited Metals. II. Some Data on Acid-Copper Deposits. Thomas A. Prater and Harold J. Read. *Plating,* v. 37, Aug. 1950, p. 830-834, 850.

Data on tensile strength and ductility of commercially produced thin electrolytic copper sheet. Satisfactory reproducibility of the bulge test is indicated by the fact that the stress-strain data fall on smooth curves which are very similar to the flow curves obtained in the conventional tension test. Best agreement was obtained with the thinner deposits. No thickness effect was observed in the range investigated, 0.66-3.6 mils. Anisotropy did not affect seriously the validity of the method. (L17, Q23, Cu)

522-L. Determination of Free Cyanide and Ammonia in Brass and Bronze Plating Baths. Part II. (Continued.) **Experimental Evaluation of Present Methods and Recommended Procedures for Free Cyanide Determination.** Samuel Heiman *Plating,* v. 37, Aug. 1950, p. 835-838, 855. (L17, S11, Cu)

523-L. Alkaline Metal Cleaning Compound Specifications. A. Mankowich. *Plating,* v. 37, Aug. 1950, p. 843-844. Important advantages result from use of the "laboratory-performance" type of specifications. (L12, S22)

524-L. Current and Metal Distribution in Electrodeposition. I. Critical Review of the Literature. John Kronsbein. *Plating,* v. 37, Aug. 1950, p. 851-854.

Historical review shows that, while considerable work has been

done and fundamentally similar problems exist in many apparently unrelated fields, existing mathematics is not capable of solving any but the most simple problems and those usually only by disregarding polarization of the electrodes. The chief task of the project, therefore, is to develop experimentally desirable practical information which is directly applicable to commercial electroplating baths. This work is proceeding with studies of fillets and their radii on both inside and outside corners and their effect on metal distribution with respect to flat surfaces. 58 ref. (L17)

525-L. Modern Masking Materials and Methods for Fabrication and Spray Finishing. Part I. Pressure-Sensitive Tapes, Die-Cut Stencils, Papers—Development and Characteristics. Arthur P. Schulze. *Products Finishing,* v. 14, Aug. 1950, p. 20-32.

Use of masking materials, techniques of application and removal. 13 ref. (L26)

526-L. Alloys of Phosphorus With Cobalt or Nickel. *Products Finishing,* v. 14, Aug. 1950, p. 32, 34, 36.

See abstract of "Electrodeposition of Alloys of Phosphorus and Nickel or Cobalt", Abner Brenner, Dwight E. Couch, and Eugenia Kellogg Williams, *Plating,* item 64-L, 1950. (L17, Co, Ni)

527-L. Galvanizing by the Sendzimir Process. K. Oganowski. *Products Finishing,* v. 14, Aug. 1950, p. 42-44, 46, 48, 50, 52, 54, 58, 60, 62, 64, 66.

See abstract of "Armco Takes Wraps Off Sendzimir Galvanizing Process", *Iron Age,* 391-L, 1950. (L16, Zn, ST)

528-L. Chemical Brightening of Aluminum. *Products Finishing,* v. 14, Aug. 1950, p. 84, 86, 88, 90. Condensed from paper by Walter R. Meyer and Steven H. Brown.

Results of research on chemical polishing of aluminum in different acid mixtures based on studies carried out in Enthone Laboratories. (L12, Al)

529-L. Drums for Petroleum Coke. Fred M. Burt. *Welding Engineer,* v. 35, Aug. 1950, p. 17-19.

Procedures and equipment for production of huge stainless steel lined vessels 80 ft. long and 70 ft. in diam. The liner is spot welded to the C-Mo steel body while the plates are flat. The assembly is then rolled to the proper curvature. Six sections each consisting of two semicircles are welded together to form the cylinder. Bottom and top sections must then be fabricated and attached by electric welding. Stress relieving is done a section at a time in a large portable furnace. (L22, J1, T26, SS, AY)

530-L. Steel Protection by Chromium Diffusion. P. Galmiche. *Engineers' Digest,* v. 11, July 1950, p. 250. Translated and condensed.

Previously abstracted from "A New Method of Thermal Chromizing and Formation of Mixed Alloys as a Result of Diffusion". *Revue de Metallurgie.* See item 381-L, 1950. (L15, CN, Cr)

531-L. Corrosion. Rogers Clark. *Canadian Metals,* v. 13, July 1950, p. 38, 40.

The over-all cost of corrosion. Use of pre-oxidized fish oil (with pigment) as a rust-inhibitive coating. (L26)

532-L. Metal Cleaning; Methods of Surface Preparation Prior to Finishing. M. Reeves. *Metal Industry,* v. 77, July 28, 1950, p. 54-55.

A survey. (L general)

533-L. Use of Radioactive Tracers in the Study of Transition and Critical Temperatures of Molecular Jets on Surfaces. (In French.) Gustave Ribaud and Marcel Devienne. *Comptes Rendus* (France), v. 230, May 22, 1950, p. 1811-1812.

"Molecular jets" are obtained by diffusion under vacuum of heated materials through orifices of diameter smaller than the mean free path of the molecules under the conditions employed. The jets are condensed on glass or metal plates outside the orifice. By use of radioactive isotopes, much smaller quantities of material can be detected. The method can also be used to detect reflection of molecules from one surface to another one. Since part of the molecules of Sb are reflected from a glass plate at 73° C., this temperature must be between the transition and critical temperatures of condensation for the particular case. The method may also be used for study of the influence of nature of surfaces on reflection and deposition of molecules. (L25, S19)

534-L. Concerning the Chemical Nature of Electropolished Metallic Surfaces and Their Practical Importance. (In French.) Pierre A. Jacquet and Marcel Jean. *Comptes Rendus* (France,) v. 230, May 22, 1950, p. 1862-1864.

Experiments showed that surfaces of Cu, Zn, and Mg electropolished in a solution of phosphoric acid may retain traces of phosphorus compounds. However Fe, polished

in a phosphoro-chromic medium, does not retain compounds rich in P or Cr, but probably again becomes covered with iron oxide. Results are discussed from the point of view of certain properties characteristic of electropolished metals. (L13, Cu, Zn, Mg, Fe)

535-L. Present Status of Industrial Electropolishing. (In German.) P. A. Jacquet. *Metalloberfläche,* v. 4, sec. A, June 1950, p. 81-92.

A general survey. (L13)

536-L. Electropolishing of Carbon and Alloy Steels and Its Commercial Application. (In German.) W. Eilender, R. Mintrop, and R. Au. *Metalloberfläche,* v. 2, sec. B, June 1950, p. 81-88.

Principles of electropolishing. Reviews the literature. Conditions for the successful polishing of steels are enumerated; an automatic apparatus for polishing small articles; special polishing jobs and conditions. 39 ref. (L13, ST)

537-L. Electropolishing in the Fine Arts. (In German.) P. Schilling. *Metalloberfläche,* v. 2, sec. B, June 1950, p. 88-91.

As applied to Al and steel. (L13, Al, ST)

538-L. Electropolishing for Production of Exact Geometrical Shapes in Machine Parts and the Like. (In German.) *Metalloberfläche,* v. 2, sec. B, June 1950, p. 92.

Specific suggestions for avoiding or minimizing nonuniform polishing. (L13)

539-L. Research on the Density of Acid Resistant Enamels. (In German.) Karl Frick. *Metalloberfläche,* v. 4, sec. A, July 1950, p. 97-101.

Studies on the permeability of enamel to gases showed that gases and liquids can move in a layer of enamel parallel to the surface of the iron. In the enamel types that are applied to cast iron over a fritted base, the undercoating of enamel is porous and thus permeable to gases and liquids; but is dense when the enamel undercoating is fused directly to the cast iron or steel. Disadvantages of enamels with a fritted base. (L27, CI, ST)

540-L. The Preparation of Sheet Metal Surfaces for Lacquering. (In German.) *Metalloberfläche,* v. 4, sec. A, July 1950, p. 108-110.

Different methods. (L26)

541-L. A Suggestion for Controlling Hard-Chromium Baths. (In German.) Günter Dehmel. *Metalloberfläche,* v. 2, sec. B, July 1950, p. 105-106.

Suggests that the bath be sampled after the number of ampere hours of electricity consumed is equivalent to the deposition of about 1% Cr. Electrical conductivity and distributing power also indicate the condition of the bath. (L17, Cr)

542-L. Influence of Surface-Active Substances on Cathodic Deposition of Cadmium. (In Russian.) V. Sotnikova and M. Loshkarev. *Zhurnal Obshchei Khimii* (Journal of General Chemistry), v. 20(82), May 1950, p. 755-761.

Cathodic polarization during deposition of Cd from pure solutions of $CdSO_4$ with additions of phenols, diphenylamine, and gelatine was studied. Influence of such organic additions was investigated and the accelerating action of some of them is explained. 13 ref. (L21, Cd)

543-L. Dependence of Smoothness of Machined Surfaces on Speed of the Polishing Wheel. (In Russian.) D. M. Tarasenko. *Stanki i Instrument,* (Machine Tools and Equipment), v. 21, Apr. 1950, p. 19.

Results of experimental investigation. Material studied is not indicated. (L10)

544-L. Surface Microgeometry Resulting From Internal Polishing of Hardened Steel. (In Russian.) A. B. Kondrat'ev. *Stanki i Instrument,* (Machine Tools and Equipment), v. 21, Apr. 1950, p. 20.

Investigated on a roller-bearing ring of 110-mm. i.d. and 53-mm. width. The influence of longitudinal polishing-wheel travel, of speed of rotation of the part being polished, of depth of cut, and of dullness of the polishing wheel. (L10)

545-L. Structure and Kinetics of Oxidation of Cathodic Copper. (In Russian.) N. A. Marchenko and A. N. Sysoev. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 23, May 1950, p. 493-495.

Rate of atmospheric oxidation of cathodic Cu was investigated in relation to conditions of electrolysis and the structure of the deposits obtained. Deposits on electrolytic rolled copper obtained at 5 amp. per sq. dm. are compared to those obtained at 1 amp. per sq. dm. (L21, R2, Cu)

546-L. Overvoltage of Hydrogen on Solid and Spongy Deposits of Copper. (In Russian.) G. P. Maitak. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 23, May 1950, p. 496-505.

Hydrogen overvoltages on Cu deposits obtained by electrolysis of solutions of $CuSO_4$ and of $CuSO_4$ in H_2SO_4 at currents of 0.001-1.0 amp. per sq. cm. were investigated. This range includes all deposits from

hard bright ones to porous spongy ones. A parallelism was noted between the change of lattice parameters of black spongy deposits and hydrogen overvoltage on them. 23 ref. (L17, Cu)

547-L. Hard Facing of the Cutting Surfaces of Peat-Cutting Machines. (In Russian.) B. M. Kontorov and P. S. Kibrik. *Torfyanaya Promphlennost* (Peat Industry), v. 27, Apr. 1950, p. 16-20.

Selection of wear-resistant hard-alloy welding electrodes. Composition of two new electrodes which are especially applicable. Welding techniques. (L24, T28, TS)

548-L. Periodic Reverse-Current Electroplating. Adolph Bregman. *Metal Progress,* v. 58, Aug. 1950, p. 199-200, 261-263.

Jernstedt's "PR" process for making electroplates smooth enough to require no buffing or polishing. Information on three types of equipment, on Cu, Ag, Zn, Cd, Au, and Ni plating baths. Applications, advantages, and cost data.
(L17, Cu, Ag, Zn, Cd, Au, Ni)

549-L. Electrodeposition of Tungsten Alloys. *Metal Progress,* v. 58, Aug. 1950, p. 244, 246.

Previously abstracted from article by F. W. Salt. *Murex Limited Review.* See item 179-L. 1950. (L17, W)

550-L. New Hard Coating Gains Wear Applications for Aluminum. *Materials & Methods,* v. 32, Aug. 1950, p. 62-64.

"File-hard" coating called "MHC" developed by Glenn L. Martin is basically an electrochemically produced film of Al_2O_3, although exact character has not been revealed. Processing characteristics, wear resistance, hardness, ductility, endurance limit, electrical conductivity, coefficient of friction, and thermal corrosion resistance. Applications. Graph compares wear resistance with that of other metals and metallic coatings. (L19, Q9, Al)

551-L. Drag-Out Losses in Wire Plating. Parts II-III. Joseph B. Kushner. *Wire and Wire Products,* v. 25, Aug. 1950, p. 646-648, 695-697.

Recommendations for reduction of losses. Use of recovery rinse baths to recover material carried out of the plating tank. Mathematical analysis of the process and how the equations can be applied to practical problems. (L17)

552-L. Mechanical Scaling of Low Carbon Steel Rods. J. Peignier. *Wire and Wire Products,* v. 25, Aug. 1950, p. 649-650, 693-694.

Process for mechanical descaling developed in France during World War II because of the shortage of pickling acids. The process was used on 0.197-in. rods but is believed to be suitable for rods up to ½ in. diam. Advantages over chemical pickling should lead to rapid commercial development. Mechanical properties of mechanically descaled and chemically pickled wire are compared. (L10, CN)

553-L. Causes and Correction of Finishing Material Defects. Paul O. Blackmore. *Paint, Oil and Chemical Review,* v. 113, Aug. 3, 1950, p. 18, 20, 22, 48, 50-51; Aug. 17, 1950, p. 19-20, 36-40, 42.

Includes section on finishes for metals. (L26)

554-L. Chromate Protection for Metals. *Chemical Age,* v. 63, Aug. 5, 1950, p. 199-200.

Corrosion-preventive characteristics of chromates and dichromates. (L14)

555-L. Defects in Enamelling. *Foundry Trade Journal,* v. 89, Aug. 3, 1950, p. 131-132.

Specimens of enameled ware which showed various types of defects, some of relatively frequent occurrence and some only rarely encountered. (L27, Fe)

556-L. (Book) **Galvanotechnik** (Electroplating) Hugo Krause. Ed. 12. 310 pages. 1949. K. F. Koehler Verlag, Eberhardstrasse 10, Stuttgart, Germany. 7.80 DM.

While intended primarily as a manual for the practical man, the author has attempted to acquaint his readers with the electrochemical phenomena involved in the production of coatings by electrodeposition and by the so-called "immersion" process. (L17)

557-L. Chrome Plating Improves Stainless Steel Grilles. Joseph Geschelin. *Automotive Industries,* v. 103, Aug. 15, 1950, p. 48-49, 116, 118.

Equipment and procedures. Includes mechanical polishing, press operations, plating, and welding.
(L17, SS, Cr)

558-L. Conveyorized Finishing of Metal Kitchen Cabinets. J. F. Snider and A. R. Nasrallah. *Industrial Finishing,* v. 26, Aug. 1950, p. 48-50, 52, 54, 58.

Metal cleaning; rustproofing; spraying hot synthetic and enamel in pressurized finishing rooms; baking application and enamel.
(L general, T10, CN)

559-L. Flock: Its Uses and Its Possibilities. *Industrial Finishing,* v. 26, Aug. 1950, p. 60-62, 64, 66, 71, 73-74, 76, 78, 80.

Flock process and its applications for decorative finishing of miscellaneous metallic and nonmetallic products. (L26)

560-L. New Finish Gives Aluminum Good Wear Resistance. Charles F. Burrows. *Iron Age,* v. 166, Aug. 24, 1950, p. 73-75.

"MHC" film finish developed by Glenn L. Martin Co. gives a scratch and wear resistant coating which is file hard, smooth, and heat resistant. Wear resistance is superior to that of hard chrome plating or cyanide case hardened steel. Effects on yield strength, ultimate strength, and elongation. (L19, Al)

561-L. Performance of Coal-Tar Enamel on Steel Water Pipe and Penstocks. Graydon E. Burnett. *Journal of the American Water Works Association,* v. 42, Aug. 1950, p. 741-748.

Modern coal-tar enamel, properly used, can effectively mitigate the interior corrosion of steel water pipe for a long period. A wrapped coal-tar-enamel coating, supplemented by cathodic protection as needed, is believed to provide virtually permanent protection to the exterior of buried steel pipe. 16 ref. (L26, CN)

562-L. Airless Blast Cleaning Aids Servel. *Steel Processing,* v. 36, Aug. 1950, p. 401, 414.

Use of airless, centrifugal-type, abrasive-blast cleaning of steel surfaces prior to Al coating, in manufacture of refrigerators. (L10, ST)

563-L. Control of Electroplating Solutions by Analysis and Observation. XII. Electro-Analysis of Plating Solutions Using Home-Made Apparatus. K. E. Langford. *Electroplating and Metal Finishing,* v. 3, Aug. 1950, p. 443-445, 454.

Apparatus may be constructed from comparatively inexpensive materials. (L17, S10)

564-L. Nickel Pickling in the Porcelain Enamel Industry. J. M. Zander. *Electroplating and Metal Finishing,* v. 3, Aug. 1950, p. 446-449.

Use, operation, and control of nickel dip bath in preparing steel surfaces for porcelain enameling. (L27, L12, ST)

565-L. Research From Abroad. An Analysis of Recent Russian Work and Patents in the Metal Finishing Field. *Electroplating and Metal Finishing,* v. 3, Aug. 1950, p. 453-454.

(L general)

566-L. Indium Alloy Deposits for Anti-Friction Bearings. *Electroplating and Metal Finishing,* v. 3, Aug. 1950, p. 459-460.

Deposition of In-Cu, In-Zn, and In-Sn alloys.
(L17, T7, Cu, In, Sn, Zn)

567-L. Paint Adhesion on Aluminium. *Electroplating and Metal Finishing,* v. 3, Aug. 1950, p. 465.

Chromate-permanganate pretreatment. (L14, Al)

568-L. A Survey of the Chemical Aspects of Some Degreasing Processes Used for Metal Finishing. J. G. Baker. *Sheet Metal Industries,* v. 27, Aug. 1950, p. 737-742.

Trichorethylene and wet degreasing—their advantages and disadvantages. Need for two-step process. (L12)

569-L. Some Notes on the Electroplating of Stainless Steels. E. E. Halls. *Sheet Metal Industries,* v. 27, Aug. 1950, p. 747-748.

Need for electroplating for various applications. Cathodic treatment and electroplating procedures. (L17, S8)

570-L. "Chromizing"—Details of a Process for Forming Chromium-Rich Layers on Steel. Philippe Galmiche. *Sheet Metal Industries,* v. 27, Aug. 1950, p. 749-750. Translated from *La Recherche Aeronautique,* Mar.-Apr. 1950.

A simplified gaseous cementation method forming smooth composite diffusion alloys which may contain —in addition to Cr—Si, Al, or Zr. These surface alloys are highly resistant to oxidation, deformation, and thermal shock. 13 ref.
(L15, ST, Cr)

571-L. A Critical Examination of Certain "Martensitic" Hardfacing Electrodes. E. Bishop. *Welding,* v. 18, July 1950, p. 290-298; Aug. 1950, p. 345-348.

First part: Composition, hardness and structure of seven deposits. Second part: Effects of base-metal admixture and preheating. Compositions, hardness data and weld microstructures.
(L24, Q29, T5, AY)

572-L. Hot Dip Galvanizing. *Metal Industry,* v. 77, July 28, 1950, p. 51-53; Aug. 4, 1950, p. 69-71; Aug. 11, 1950, p. 85-86.

Summarizes proceedings of international conference at Copenhagen. (L16, Zn, CN)

573-L. On the Principles of Electrodeposition of Metal Powders. (In English.) Gosta Wranglen. *Transactions of the Royal Institute of Technology,* No. 37, 1950, 39 pages.

The formation of powdery and spongy metal deposits on the cathode. Factors responsible for their formation in the fused-salt electro-

lysis and of Cu, Fe, Ni, Zn, and Cd electrolysis. Other theories of powder formation, involving assumptions of secondary oxidation at the cathode and discharge of complex ions, are criticized. 59 ref. (L17, Cd, Cu, Fe, Ni, Zn)

574-L. Electroplating Thoroughout the World. *Metal Finishing,* v. 48, June 1950, p. 74-107, 110-132.

Survey articles as follows: "Argentina", Robert C. Bray; "Australia", J. J. Dale; "Brazil", Alberto Paulo Ribbe; "Canada", A. C. West; "China", C. C. Wong; "England", S. Wernick; "Finland", Erik Nordgren; "France", Paul E. Bourgeois and Joseph B. Loiseau; "Germany", Richard Springer; "India", T. Banerjee and Bhupal Naha; "Italy", Roberto Piontelli; "Japan", Sakee Tajima, "Low Countries" (anon.); "Mexico", Miguel Bosch and Tomas Rodriguez, V; "South Africa", Harold Knocker; "Spain", Vicente Massuet Grau, Joaquin Agullo Marly, and Juan Vericat Raga; "Sweden", Helle C. Quarnstrom; and "Switzerland", Henry Reymond. (L17)

575-L. High Production Gold Plating. M. Shapiro. *Metal Finishing,* v. 48, July 1950, p. 46-49.

Recommended procedures on the basis of experience in the plating department, Gillette Safety Razor Co. (L17, Au)

576-L. The Determination of Impurities in Nickel Plating Solutions. Part II. Louis Silverman. *Metal Finishing,* v. 48, July 1950, p. 50-55.

Detailed procedures for Cu, Fe, Pb, Mg, SiO_2, Sn, and Zn. (L17, S11, Ni)

577-L. Hard Chrome Plating on Aluminum Alloys. K. Gebauer. *Metal Finishing,* v. 48, July 1950, p. 56-58, 64. Reprinted from translation in *Metal Industry,* v. 76, Mar. 10, 1950, p. 186-188.

Previously abstracted from *Archiv für Metallkunde.* See item 8-165, 1949. (L17, Cr, Al)

578-L. Electroplating Bright, Hard Nickel-Phosphorus or Cobalt-Phosphorus Alloys. *Metal Finishing,* v. 48, July 1950, p. 65, 67.

See abstract of "Electrodeposition of Alloys of Phosphorus and Nickel or Cobalt", Abner Brenner, Dwight E. Couch, and Eugenia Kellogg Williams, *Plating,* items 64-L and 98-L. (L17, Co, Ni)

579-L. Water-Soluble Cutting Oils as Pickling Inhibitors. Karl F. Hager and Morris Rosenthal. *Oil and Gas Journal,* v. 49, Aug. 24, 1950, p. 142-143, 145.

The above are efficient against acid attack of the base metal, and in addition, give a temporary protection against rerusting. Mild steel (SAE 1010) was used for test specimens. (L12, CN)

580-L. Metal Spraying Pays Off as "Finishing Tool". *Steel,* v. 127, Aug. 28, 1950, p. 79-80, 82.

Conditions governing type of coating needed. Paint vehicles, long-term protection, industrial vs. mild atmospheres, fresh water vs. sea water, and corrosion at elevated temperatures. Sealing and finishing of sprayed metal. Involves Al and Zn coatings. (L23, R3, R4, Al, Zn)

581-L. Galvanizing by the Sendzimir Process. K. Oganowski. *Blast Furnace and Steel Plant,* v. 38, Aug. 1950, p. 912-916.

See abstract of "Armco Takes Wraps Off Sendzimir Galvanizing Process", *Iron Age,* item 391-L, 1950. (L16, Zn, ST)

582-L. Conveyers Speed Sash Finishing. Walter Rudolph. *Iron Age,* v. 166, Aug. 31, 1950, p. 56-59.

Truscon Steel's new million-dollar steel window-sash plant which includes a fully conveyerized Bonderizing-priming installation. Frames and vents, fabricated from cold rolled sheet stock, are cleaned, Bonderized, painted, and baked within 100 min. (L14, L26, T26, CN)

583-L. Methods of Evaluating Aircraft Primers. Edward T. Nelson. *ASTM Bulletin,* July 1950, p. 88-90; discussion, p. 90-92.

Method for evaluating physical, film, and resistance properties of primers for Al alloys, steel, and Mg alloys. (L14, Al, Mg, ST)

584-L. Porcelain Enamel as a Corrosion Resistant Coating for Metals. G. H. McIntyre. *Enamelist,* v. 27, Summer-Fall 1950, p. 3-9. (L27)

585-L. Control of Quality by Application, Drying and Firing of Porcelain Enamel. E. E. Bryant. *Enamelist,* v. 27, Summer-Fall 1950, p. 15-19.

Recommended equipment and procedures. (L27)

586-L. Cost Reduction in Porcelain Enamel Operations Through Product and Process Control. Part I. Product Control. Harold P. Connare. *Enamelist,* v. 27, Summer-Fall 1950, p. 20-27.

Recommended equipment and procedures. (To be continued.) (L27)

587-L. Determination of Opacity by Means of a Translucency Meter. Jesse DeLafayette Walton, Jr. *Enamelist,* v. 27, Summer-Fall 1950, p. 31-36.

Equipment and procedures as applied to porcelain enamel. Typical data. (L27)

588-L. A High Temperature Porcelain Enamel for Tungsten. J. C. Horsfall. *Enamelist,* v. 27, Summer-Fall 1950, p. 39-41.

Development of a porcelain enamel for tungsten which has a PCE of 30. (L27, W)

589-L. Latex Films as Temporary Protective Coatings for Metal Surfaces. *Rubber Age,* v. 67, Aug. 1950, p. 560.

New rubber latex that is applicable to iron and steel as well as nonferrous and enameled surfaces. It is applied by a dipping process. (L26)

590-L. When To Use Electrolytic Polishing. C. E. Naylor. *Plating Notes,* v. 2, June 1950, p. 91-95.

Limitations of electropolishing as a production process, and recommendations concerning its application to the finishing of specific alloys and articles. Status of the process, particularly its use in conjunction with mechanical polishing. (L13)

591-L. Additive Compounds in Electroplating. Marvin Rubinstein. *Metal Finishing,* v. 48, May 1950, p. 54-58, 78; Aug. 1950, p. 51-56, 58.

Prevalent theories of the mechanism of addition-agent action in plating solutions. (L17)

592-L. Preparing Zinc-Base Die Castings for Electroplating. Joseph Haas. *Metal Finishing,* v. 48, Aug. 1950, p. 57-58.

Originally intended as a supplement to a previous article (Aug. 1949 issue). Haas's experiences in the laboratory and plant are in substantial disagreement with the conclusions of MacMullen and Ozar. (L17, Zn)

593-L. Restoration of Ancient Bronzes and Other Alloys. *Metal Finishing,* v. 48, Aug. 1950, p. 66.

Electrolytic method developed by Colin Fink and Charles H. Eldridge for Metropolitan Museum of Art. (L17, T9, Cu)

594-L. Production Plating at Hall-Mack. Fred M. Burt. *Metal Finishing,* v. 48, Aug. 1950, p. 67-70.

Procedures and equipment of Los Angeles manufacturer of bathroom accessories. Mainly Zn and brass parts are plated with Cr and Ni. (L17, Cu, Zn, Cr, Ni)

595-L. Coatings Vs. Corrosion. *Paint, Oil & Chemical Review,* v. 113, Aug. 31, 1950, p. 24-25. Reprinted from *Paint Progress,* v. 8, No. 2.

Use of paint-type coatings for protection of offshore drilling platforms. (L26, T28, CN)

596-L. Applications, Precautions and Suggestions on the Proper Procedures for Hard Surfacing Manganese Steel. D. B. Rankin. *Industry & Welding,* v. 23, Sept. 1950, p. 36, 38, 66-67. (L24, AY)

597-L. Determination of Free Cyanide and Ammonia in Brass and Bronze Plating Baths. Part III. Experimental Evaluation of Present Methods and Recommended Procedure for Ammonia Determination. Samuel Heiman and F. Albert Cotton. *Plating,* v. 37, Sept. 1950, p. 939-944, 953.

26 references. (L17, S11, Cu)

598-L. Why Pay for Porosity Research? W. A. Wesley. *Plating,* v. 37, Sept. 1950, p. 949-950, 953.

Argues in favor of AES-sponsored research on porosity of electrodeposits. (L17)

599-L. Porcelain Enamels Steel in a Continuous Strip Operation. *Ceramic Industry,* v. 55, Sept. 1950, p. 72-74.

In making Mirawal, a porcelain-enameled light-gage steel, Baltimore Porcelain Steel Corp., uses a continuous, automatic operation for processing the metal. Mirawal is now bonded to Masonite to make a new porcelain-enamel building product. (L27, ST)

600-L. How To Metallize Glass and Other Ceramics. John Starr. *Ceramic Industry,* v. 55, Sept. 1950, p. 78-80, 105.

Miscellaneous procedures and applications. (L23)

601-L. Electroplating of Beryllium. M. Kolodney. *U. S. Atomic Energy Commission,* AECD-2845, Aug. 1950, 3 pages.

Surface preparation. Plating solutions and operation conditions for Ag, Au, Cd, In, and Sn plating. (L17, Be, Ag, Au, Cd, In, Sn)

602-L. Studies on the Surface Areas of Cadmium and Copper, and the Mechanism of Cadmium Polarization. J. M. Roxburgh and C. A. Winkler. *Canadian Journal of Research,* v. 28, sec. B, July 1950, p. 383-390.

Areas of mechanically cleaned Cd electrodes, measured by rate of build-up of hydrogen over-voltage, were shown to decrease with time of immersion in air-free acid solutions. The measured area depended upon the current used for the measurement, particularly with electrodes of large areas. Cu electrodes did not show similar effects. Cd polarization was linearly related to current, and independent of the measured area. This indicates that concentration polarization is operative in the deposition of Cd. (L17, Cd)

603-L. Potential of Cadmium in Sulphuric Acid. J. M. Roxburgh and C. A. Winkler. *Canadian Journal of Re-*

search, v. 28, sec. B, July 1950, p. 391-394.

Potentials were found to be less negative than those reported for deposited electrodes. Cleaning under air-free conditions did not remove this difference. (L17, Cd)

604-L. A New Use for Wire To Replace Sand Blasting. *Wire Industry,* v. 17, Aug. 1950, p. 676.

Method in which cut steel wire replaces sand or shot. (L10, T5, CN)

605-L. Hot Dip Galvanizing; A Discussion on Residuals and Their Treatment. *Metal Industry,* v. 77, Aug. 18, 1950, p. 105-106.

Summarizes discussion at recent international conference at Copenhagen. (L16, Zn, CN)

606-L. Cleaning Metals by Blast. J. Lomas. *Machinery Lloyd* (Overseas Edition), v. 22, Aug. 19, 1950, p. 91-95.

Equipment and procedures. (L10)

607-L. Coating With Polythene. *British Plastics,* v. 23, Aug. 1950, p. 56-59.

Equipment and procedures for application to metals and nonmetals. (L26)

608-L. Vinyl Protection for Ships' Hulls. *British Plastics,* v. 23, Aug. 1950, p. 68-69.

Includes test-panel photographs. (L26, T22)

609-L. Contribution to the Study of Electrolytic Zinc Coatings. (In French.) Jean Ginguené. *Métaux & Corrosion,* v. 25, May 1950, p. 126-134.

Standard compositions of acid and alkaline baths used, influence of components on the process, technique of operation, and optimum conditions. (L17, Zn)

610-L. The Problem of Hard Zinc in Hot Galvanizing. (In German.) R. Haarmann. *Metalloberfläche,* v. 4, sec. A, Aug. 1950, p. 113-119.

Means for reducing the undesirable hard zinc formed during hot galvanizing. Economical methods of removing it from the bath and of utilizing it. (L16, Zn)

611-L. Anodes. (In German.) (Concluded.) Edmund R. Thews. *Metalloberfläche,* v. 2, sec. B, Aug. 1950, p. 115-117.

Use and production of brass anodes. Advantages of brass plating with pure copper anodes and Zn salts in the bath are described. (L17, Cu)

612-L. Electroplating and Metal Finishing Developments in Germany: 1940-1950. (In German.) Richard Springer. *Metalloberfläche,* v. 2, sec. B, Aug. 1950, p. 119-123.

100 references. (L17, L general)

613-L. Influence of Various Additions to the Hard Chromium Plating Bath on Character of the Chromium Layer. (In Czech.) J. Doskar. *Hutnické Listy,* v. 5, June 1950, p. 240-247.

Value of certain additions is demonstrated. 22 ref. (L17, Cr)

614-L. The Analysis of Cadmium Cyanide Plating Solutions. Louis Silverman. *Metal Finishing,* v. 47, May 1949, p. 62-65.

Details of procedures. (L17, S11, Cd)

615-L. Submerged Abrasive Burnishing. Joseph E. Wingate. *Metal Finishing,* v. 47, May 1949, p. 55-61; June 1949, p. 72-78.

Application and principles of the process. Types of media and soaps. Part II: Detailed recommendations for parts handling, stone curing, selection of media sizes, work-load ratios, barrel speeds, etc. (L10)

616-L. Refinishing Hollow Ware. Joseph Haas. *Metal Finishing,* v. 47, June 1949, p. 79-82.

Recommended equipment and procedures. General instructions and details applicable to each of the base metals and electrodeposits ordinarily encountered. Includes polishing and stripping of old coatings. (L17)

617-L. Deposition of Metallic Films by Vacuum Methods. Samuel Wein. *Metal Finishing,* v. 47, July 1949, p. 42-46.

Equipment, procedures, and applications. 29 ref. (L25)

618-L. Carbonate Removal From Cyanide Plating Solutions. H. F. Ross. *Metal Finishing,* v. 47, July 1949, p. 47-48.

Improved procedure which involves treatment of the baths with calcium carbide. 10 ref. (L17)

619-L. Electrodeposition of Copper-Lead Alloys From Fluoborate Solutions. C. B. F. Young and Clifford Struyk. *Metal Finishing,* v. 47, July 1949, p. 49-50, 53.

While the authors report negative results, it is felt that the data developed will be of interest, and may possibly stimulate further research. (L17, Cu, Pb)

620-L. Finishing Surgical and Hospital Equipment at American Sterilizer Co. Walter Rudolph. *Metal Finishing,* v. 47, July 1949, p. 51-53.

Polishing and plating equipment and procedures. The finishing problem is one of extreme diversity as to size and shape, as well as types or kinds of finish. (L12, L17, T10)

621-L. Tin-Zinc Alloy Plating. P. J. Miller and J. W. Cuthbertson. *Metal*

Finishing, v. 47, Aug. 1949, p. 44-49.

Equipment and procedures at British plant. The preferred composition is 75-80% Sn, balance Zn. Main application to date has been in the electrical industry. Other uses are under consideration. The coating appears to be suitable for all uses for which Cd has been employed. (L17, Sn, Zn)

622-L. A Critical Survey of Plating Practice for Zinc-Base Die-Castings. Joseph Haas. *Metal Finishing,* v. 47, Aug. 1949, p. 50-55.

Journal and patent literature. Present-day cleaning and plating practice. 25 ref. (L17, Zn)

623-L. High Pressure Sandblasting. Joseph Albin. *Metal Finishing,* v. 47, Aug. 1949, p. 56-57.

Rigorous control of sand and timing are combined with operating at higher air pressures to expedite a variety of cleaning jobs in an airlines maintenance shop. (L10)

624-L. Adsorption Phenomena in the Plating Room. H. A. Fudeman. *Metal Finishing,* v. 47, Aug. 1949, p.58-61.

Basic principles of adsorption. Present and potential application to electroplating. 15 ref. (L17, P13)

625-L. Future Outlook for Metals Used in the Plating Industry. *Metal Finishing,* v. 47, Aug. 1949, p. 62-63.

Taken from a report published by the Economic Cooperation Administration for the European Recovery Program. Covers Cu, Pb, Zn, Cd, Ni, and Sn.

(L17, A4, Cu, Pb, Zn, Cd, Ni, Sn)

626-L. Where Do We Go From Here? Part II. Electronics in Electroplating. Joseph B. Kushner. *Metal Finishing,* v. 47, Sept. 1949, p. 48-51, 74.

Possible future improvements in the electroplating process, including automatic plating-current control, automatic metal-content control, and automatic replenishment of brighteners. Circuit diagrams. (For Part I see Item 8-71, 1949.) (L17)

627-L. Immersion Plating of Zinc, Cadmium, and Tin on Aluminum Alloys. *Metal Finishing,* v. 47, Sept. 1949, p. 52-56. Condensed from "Deposition of Metals on Aluminum by Immersion From Solutions Containing Fluorides", by Samuel Heiman.

Previously abstracted from *Journal of the Electrochemical Society.* See item 7D-26, 1949. (L17, Al, Zn, Cd, Sn)

628-L. Sargent's New Finishing Department Exemplifies Close Co-ordination. Lawrence J. Durney. *Metal Finishing,* v. 47, Sept. 1949, p. 57-59.

Polishing, buffing and lacquering sections of Sargent and Co., manufacturers of builders hardware. (L10, L12, L26, T6)

629-L. Colorimetric Methods for the Analysis of Electroplating Baths. D. Gardner Foulke. *Metal Finishing,* v. 47, Oct. 1949, p. 58-63, 67.

Theory. Determination of Ni, Co, Pb, Fe, Mn, Cu, Cd, SiO_2, Al, and Zn in Ni-plating baths. 18 ref. (L17, S10, Ni)

630-L. Mechanical Surface Finishing—Tradition or Engineering? Ray Kessler. *Metal Finishing,* v. 47, Oct. 1949, p. 64-67.

Obstacles impeding full development of mechanized mechanical polishing. Several modern pieces of equipment. (L10)

631-L. High Speed Buffing of Screw Heads. *Metal Finishing,* v. 47, Oct. 1949, p. 74-75.

Previously abstracted from *Steel.* See item 7B-155, 1949. (L10, T7)

632-L. Blast Cleaning With Suspended-Abrasive Media. Edward Rosen. *Metal Finishing,* v. 47, Oct. 1949, p. 76-78, 80.

The process and some of its applications. (L10)

633-L. Gaseous Plating. *Metal Finishing,* v. 47, Oct. 1949, p. 79-80.

Equipment and procedure developed by Commonwealth Engineering Co., Dayton. Gaseous metal carbonyls deposit their metal content on the articles at 400° F. Dry method achieves high rates of deposition and permits processing of many materials not readily treated by conventional plating methods. (L25)

634-L. Metal Finishing Research at Battelle Institute. *Metal Finishing,* v. 47, Nov. 1949, p. 42-47.

Facilities and method of handling research projects. Practical results of some of Battelle's research in this field. (L general, A9)

635-L. Chemical Polishing. *Metal Finishing,* v. 47, Nov. 1949, p. 50, 52.

New process developed at Battelle Memorial Institute, whereby metal products can be given a bright, reflective surface without mechanical or electrical operations. Metals that can be chemically polished successfully include brass, copper, nickel-silver, monel, nickel, and aluminum. (L12)

636-L. Barrel Tumbling Practice on Yale Hardware. J. E. Charleson. *Metal Finishing,* v. 47, Nov. 1949, p. 51-52.

Brass and bronze castings are rolled wet in unlined barrels with sand and zinc slugs, to smooth rough surfaces, and then undergo dry tumbling to scour. Many machined parts are deburred by tumbling. (L10, Cu)

637-L. Hard Nickel Plating. M. H. Orbaugh. *Metal Finishing,* v. 47, Nov. 1949, p. 53-55, 59.

Compares hard Ni with hard Cr plating; various advantages and applications. Physical properties of the deposits, solutions and operating conditions, preparation of base metal, machining, and costs. (L17, Ni)

638-L. The Deposition of Copper From Phosphoric Acid Solutions. C. B. F. Young and Fred I. Nobel. *Metal Finishing,* v. 47, Nov. 1949, p. 56-59.

Object of investigation reported was to find a Cu complex with a P compound, other than the pyrophosphate, that would plate with superior results, operate at a pH close to neutral, plate directly on Fe without the use of a Cu "strike" solution, form a stable solution, and be cheap. Objectives were partially achieved. (L17, Cu, Fe)

639-L. Adhesion of Hard Nickel to High-Strength Aluminum Alloy. B. B. Knapp. *Metal Finishing,* v. 47, Dec. 1949, p. 42-46.

A method of electroplating a 7% Zn aluminum alloy with an adherent deposit of hard Ni. A new quantitative adhesion test developed for measuring the adhesion of Ni on Al sheet. 11 ref. (L17, Al, Ni)

640-L. Where Do We Go From Here? Part III. Water Control. Joseph B. Kushner. *Metal Finishing,* v. 47, Dec. 1949, p. 52-58, 67.

Possibilities of improvement in the electroplating process by more careful control of the composition and purity of the water used. 11 ref. (L17)

641-L. Electro-Polishing of Refrigerator Shelves. D. Chieger. *Metal Finishing,* v. 47, Dec. 1949, p. 59-62, 69.

Equipment, procedures, and solutions for stainless shelves made by L. A. Young Spring & Wire Corp., Detroit. (L13, SS)

642-L. Automatic Plating at the E. Ingraham Co. W. A. Raymond. *Metal Finishing,* v. 47, Dec. 1949, p. 63-67.

Equipment and procedures of a clock and watchmaker. Bright Ni, Brass, or Cr are applied to any one of three base metals used (steel, brass, or nickel silver). (L17, Cu, Ni, Cr, ST)

643-L. Blastcleaning Stainless Steel Castings. Herbert Gibbs. *Metal Finishing,* v. 47, Dec. 1949, p. 68-69.

Equipment and procedures of Cooper Alloy Foundry Co., as applied to stainless, nickel and monel. (L10, SS, Ni)

644-L. Important Developments in Metal Finishing During 1949. Walter A. Raymond. *Metal Finishing,* v. 48, Jan. 1950, p. 46-55, 108.

171 references. (L general)

645-L. Practical Yellow Gold Plating. Jerome L. Bleiweis. *Metal Finishing,* v. 48, Jan. 1950, p. 63-68.

The problem of producing gold of the desired color and brilliance. Typical plating cycles for the base metals brass, steel, Zn (die castings), Al, and Pb. Color-control procedures; also solution of several plating difficulties. (L17, Au)

646-L. Radioactive Tracers Used To Study Plating Process. *Metal Finishing,* v. 48, Jan. 1950, p. 69. Condensed from "Experiments in Chromium Electrodeposition With Radioactive Chromium", Fielding Ogburn and Abner Brenner.

Previously abstracted from *Journal of the Electrochemical Society.* See item 23-L, 1950. (L17, Cr)

647-L. Calculating Metal Cost in Plating Cadmium. *Metal Finishing,* v. 48, Jan. 1950, p. 74.

A nomogram. (L17, Cd)

648-L. Diversified, Modern Job-Shop Plating. Fred M. Burt. *Metal Finishing,* v. 48, Feb. 1950, p. 42-45.

Plant of Cadmium & Nickel Plating Co., Los Angeles. (L17)

649-L. The Analysis of Chrome Plating Solutions. Louis Silverman. *Metal Finishing,* v. 48, Feb. 1950, p. 46-54.

A method for determination of both chromic acid and trivalent Cr said to be much more rapid than those in common use in most plating laboratories. An interesting new theory regarding the role played by the H_2SO_4 catalyst in Cr plating. (L17, S11, Cr)

650-L. West Coast Electroplating Industry. Elburn Marcum. *Metal Finishing,* v. 48, Feb. 1950, p. 63-66.

A survey. (L17)

651-L. Calculating Metal Cost in Gold Plating. *Metal Finishing,* v. 48, Feb. 1950, p. 71.

A nomogram. (L17, Au)

652-L. Electrolytic Polishing of Metallic Surfaces. Pierre A. Jacquet. *Metal Finishing,* v. 47, May 1949, p. 48-54; June 1949, p. 83-92; July 1949, p. 58-64; Sept. 1949, p. 60-67; Oct. 1949, p. 68-73; v. 48, Jan. 1950, p. 56-62; Feb. 1950, p. 55-62.

Part I. Fundamental phenomena accompanying the electropolishing of metals. Part II: Commercial procedures in general, on the basis of the literature. Part III: Scientific and industrial applications in general. Part IV: Uses in metallography. Part V: The phenomena of

corrosion, oxidation, and passivation; ion exchange, magnetic properties and surface electrical conductivity; and electron emission by metals. Part VI: Use in study of hardness and microhardness, interfacial diffusion, and friction and wear; commercial applications. Final installment: Electrolytic superfinishing and electropolishing as an intermediate stage in manufacturing. About 500 ref. (L13, M21)

653-L. Laboratory Investigations on Metal Cleaning. Samuel Spring *Metal Finishing,* v. 48, Mar. 1950, p. 67-72, 74.

Results of a fundamental study of the process of oil removal from metal surfaces, using an alkaline-silicate cleaner containing a surface-active agent. Carefully processed metal panels were cleaned under controlled conditions of time, temperature, agitation, and concentration of cleaner. A "cleaning index" is obtained from the average of ten observations. Effects of oxide coating, surface roughness, and oil composition were studied. (L12)

654-L. Some Notes on the Electroplating of Powder Metallurgy Parts. Henry H. Hausner. *Metal Finishing,* v. 48, Mar. 1950, p. 73-74.

Methods, mainly on the basis of the literature. (L17)

655-L. The Use of Glycerine in Electropolishing. Milton A. Lesser. *Metal Finishing,* v. 48, Mar. 1950, p. 75-77.

A review. 17 ref. (L13)

656-L. New Abrasive Methods Cut Costs. Stan L. Johnson. *Metal Finishing,* v. 48, Mar. 1950, p. 78-80.

Prefinishing, belt-finishing operations, reconditioning rusted steel stock, and other modern polishing techniques. (L10)

657-L. Calculating Metal Cost in Silver Plating. *Metal Finishing,* v. 48, Mar. 1950, p. 83.

A nomographic chart. (L17, Ag)

658-L. Electroforming—A Versatile, Precision Production Method. Benjamin Melnitzky. *Metal Finishing,* v. 48, Apr. 1950, p. 44-48.

The process and varied applications. (L18)

659-L. Development of Alkaline Cleaners. Robert H. Tiers. *Metal Finishing,* v. 48, Apr. 1950, p. 49-53.

Historical review; formulation and testing of alkaline cleaners. New test procedure called the "swirl method". (L12)

660-L. Electroplated Tin-Zinc Alloy Coatings on Iron and Steel. E. E. Halls. *Metal Finishing,* v. 48, Apr. 1950, p. 54-58, 62.

Previously abstracted from *Metallurgia.* See item 93-L, 1950. (L17, Sn, Zn, ST)

661-L. Production Chrome Plating of Hand Tools. Fred M. Burt. *Metal Finishing,* v. 48, Apr. 1950, p. 59-62.

Equipment and procedures of Proto, Los Angeles. (L17, T6, Cr)

662-L. Calculating Metal Cost in Tin Plating. *Metal Finishing,* v. 48, Apr. 1950, p. 74.

A nomographic chart. (L17, Sn)

663-L. United Chromium's Metal Finishing Laboratory. *Metal Finishing,* v. 48, May 1950, p. 67-69.

New Detroit research center. (L general, A9)

664-L. Electropolishing With Hexafluorophosphoric Acid. H. F. Martin and C. B. F. Young. *Metal Finishing,* v. 48, May 1950, p. 70-74.

Use of above reagent for electropolishing of stainless and carbon steel, brass, and nickel silver was investigated. H_2SO_4, H_3PO_4, and H_2CrO_4 were also investigated in combination with hexafluorophosphoric acid. Good results were obtained with stainless steel and nickel silver. Brass polishing was only fair, and hot rolled steel could not be polished. (L13, CN, SS, Cu)

665-L. Calculating Metal Cost in Nickel Plating. *Metal Finishing,* v. 48, May 1950, p. 83.

A nomographic chart. (L17, Ni)

666-L. The Determination of Impurities in Nickel Plating Solutions. Parts I and II. Louis Silverman. *Metal Finishing.* v. 48, May 1950, p. 59-63, 66; July 1950, p. 50-55.

Part I: Detailed procedures for Al, NH_4 ion, Cd, Cr, and Co. Part II: Procedures for Cu, Fe, Pb, Mg, and Zn. (L17, S11)

667-L. Complex Compounds in Industrial Electroplating. Part 1. Seymour Senderoff. *Metal Finishing,* v. 48, July 1950, p. 59-64.

The nature of complexes, functions of complexes in plating, complexes in Cu plating, and complexes in Ni plating. 36 ref. (To be continued.) (L17)

668-L. The Customer Looks at Plated Products. Thor H. Westby and Robert E. Parkinson. *Proceedings of the American Electroplaters' Society,* v. 36, 1949, p. 29-32; discussion, p. 32-33.

Quality specifications from the distributor's viewpoint. Plating thickness and salt-spray corrosion resistance. (L17, S22)

669-L. Process Control of Electroplating. Russel E. Harr. *Proceedings of the American Electroplaters' Society,* v. 36, 1949, p. 35-44; discussion,

p. 44-45.

Maintenance of equipment, cleaning solutions, and plating solutions. Spectrographic tests of plating solutions, methods of measuring coating thickness, and recording charts for process and product measurements. (L17)

670-L. Availability of Plating Materials. I. Alkalies, Including Silicates and Phosphates. J. J. Duffy, Jr. **II. Cadmium.** L. V. Nagle. **III. Chromic Acid and Chromates.** Henry Mahlstedt. **IV. Cyanides.** E. W. McGovern. **V. Lead.** Charles R. Ince. **VI. Nickel.** Clarence H. Sample. **VII. Tin.** R. J. Nekervis. **VIII. Zinc.** Ralph F. Burns. *Proceedings of the American Electroplaters' Society*, v. 36, 1949, p. 53-61. (L17, A4)

671-L. PR Cyanide Copper Plating. George W. Jernstedt. *Proceedings of the American Electroplaters' Society*, v. 36, 1949, p. 63-67; discussion, p. 76-78.

See abstract of "Brighter Finishes With 'PR' Plating", *Steel*, item 307-L, 1950. (L17, Cu)

672-L. Electrodeposition of Nickel at High Current Density. W. A. Wesley, W. W. Sellers, and E. J. Roehl. *Proceedings of the American Electroplaters' Society*, v. 36, 1949, p. 79-92; discussion, p. 92.

The literature and new experiments on theoretical limiting current density. It was found that limiting current density for sound Ni deposits increases approximately linearly with rate of flow of electrolyte over cathode surface, that at current density of 4260 asf., a Ni deposit 0.001 in. thick is formed in 16 sec.; that the Watts bath suffers serious disadvantages compared with the chloride bath; that at limiting current densities both anode and cathode efficiencies are still approximately 100%; and that these coatings are less ductile and slightly harder than those made at normal rates. 22 ref. (L17, Ni)

673-L. Some Factors That Influence the Operating Characteristics of Chromium Plating Baths. R. O. Hull and J. B. Winters. *Proceedings of the American Electroplaters' Society*, v. 36, 1949, p. 93-100; discussion, p. 100-101.

Experimental study of chromium plating of buffed Watts gray Ni, and also bright Ni, and of factors relating to passivity, including means for overcoming it. (L17, Cr, Ni)

674-L. Scratch Hardness and Abrasion Hardness of Electrodeposited Chromium. J. M. Hosdowich. *Proceedings of the American Electroplaters' Society*, v. 36, 1949, p. 103-125; discussion, p. 126.

Plating procedure and hardness tests. Correlation between hardness and appearance. 19 ref. (L17, Q29, Cr)

675-L. Acid Dips in Cleaning Cycles. A Round Table Discussion. I. Acid Dips for Low Carbon Steel. II. Acid Dips for High Carbon Steel. III. Acid Dips for Copper and Copper Base Alloys. IV. Acid Dips for Zinc Base Alloys. *Proceedings of the American Electroplaters' Society*, v. 36, 1949, p. 127-147.

Each part has an introduction by a separate author. Introduction to Part I includes 30 ref. (L12, CN, Cu, Zn)

676-L. Plating on Aluminum Alloys. Fred Keller and Walter G. Zelley. *Proceedings of the American Electroplaters' Society*, v. 36, 1949, p. 149-162; discussion, p. 189-191.

A general discussion, considering Al alloy structure, preplating treatments, plating procedure, resulting finishes, and finish testing. 11 ref. (L17, Al)

677-L. Cleaning, Etching, Chemical Polishing and Brightening of Aluminum. Walter R. Meyer and Steven H. Brown. *Proceedings of the American Electroplaters' Society*, v. 36, 1949, p. 163-188; discussion, p. 189-191.

Organic and alkali cleaners, effects of additives on NaOH reaction with Al, acid treatment, inhibitors in acid solutions, etching to produce a dead white surface, and effects of various treatments on cell potentials of wrought alloys. Theory of acid brightening and polishing of wrought alloys. 11 ref. (L12, Al)

678-L. Amorphous Phosphate Coatings for Protection of Aluminum Alloys and for Paint Adhesion. Alfred Douty and F. P. Spruance, Jr. *Proceedings of the American Electroplaters' Society*, v. 36, 1949, p. 193-216; discussion, p. 216.

Coating process and characteristics of Alodine. Compares it with better known coatings. 16 ref. (L14, Al)

679-L. Electroplating Magnesium and Its Alloys. H. K. DeLong. *Proceedings of the American Electroplaters' Society*, v. 36, 1949, p. 217-226; discussion, p. 226-227.

Process in which an immersion zinc coating is applied followed by copper striking and electroplating in standard plating baths. (L17, Mg)

680-L. Distribution of Electrodeposited Metal on Some Simply Shaped Cathodes. John Kronsbein and Lester C. Morton. *Proceedings of the American Electroplaters' Society*, v. 36, 1949,

p. 229-238: discussion, p. 239.

Distribution in relation to part design. (L17)

681-L. Outstanding Problems of Porous Structure in Electrodeposits. N. Thon. *Proceedings of the American Electroplaters' Society,* v. 36, 1949, p. 241-247: discussion, p. 247-249.

Outlines A.E.S. Research Project No. 6. Problems involved and approaches being made to their solution. (L17)

682-L. Surface Finish and the Designer. Roy P. Trowbridge. *Product Engineering,* v. 21, Sept. 1950, p. 122-127.

Practical aspects of a new approach to the measurement, specification, and application of surface-finish control of metallic parts. Types of instruments, standards for various production methods, and physical properties relating to condition of the metallic surface are compared and evaluated. (L15)

683-L. Barrel Finishing. L. Mable. *Electroplating and Metal Finishing,* v. 3, Sept. 1950, p. 479-482.

Precise recommendations for the treatment of specific metal parts. (L10)

684-L. Intrinsic Porosity. *Electroplating and Metal Finishing,* v. 3, Sept. 1950, p. 487-490.

Intrinsic porosity is an extremely fine form of porosity. Such fine pores are damaging to an electrodeposit, because they are invariably filled with chemicals from the plating solution which accelerate corrosion. Why such pores are inevitable in an extremely thin electrodeposit, and the possibilities of eliminating them from electrodeposits of commercial thickness. (To be continued.) (L17)

685-L. Depositing Lead-Indium Alloys From Organic Perchlorate Electrolytes. *Electroplating and Metal Finishing,* v. 3, Sept. 1950, p. 501.

Recent British patent. Conditions for 3 and 5% In deposits and also for one containing 42% Pb, 42% Sn, and 16% In. (L17, In, Pb, Sn)

686-L. Liquid Blasting Cuts Cost of Reconditioning Die-Casting Dies. Albert G. Lintel. *Machinery* (American), v. 57, Sept. 1950, p. 170-174.

"Hydro-Finish" process in which a very fine abrasive, suspended in a liquid, is delivered to a blasting nozzle by means of a circulating pump. (L10)

687-L. The Metal Under the Plate. Howard E. Boyer. *Products Finishing,* v. 14, Sept. 1950, p. 14-20, 22.

Electroplating variables related to composition and condition of the base metal. Considers ferrous and nonferrous metals, with emphasis on steels and cast irons. Effects of microstructure on the alloying process which accompanies formation of good quality electrodeposits. (L17)

688-L. Modern Masking Materials and Methods for Fabrication and Spray Finishing. Part II. Pressure-Sensitive Tapes, Die-Cut Stencils, Papers—Applications and Uses. Arthur P. Schulze. *Products Finishing,* v. 14, Sept. 1950, p. 26-36, 38, 40.

(L26)

689-L. Color Lithography Process for Large Steel Drums. *Products Finishing,* v. 14, Sept. 1950, p. 46-48, 50, 52.

Process developed by Rheem Mfg. Co. (L26)

690-L. Anodic Treatment of Manufactured Products. P. Smith and P. Shaw. *Light Metals,* v. 13, Aug. 1950, p. 449-452.

Effects of chemical composition, state of the metal (sand, gravity or pressure cast, wrought, degree and type of working, etc.), and design, upon the quality of the resulting finish. (To be continued.) (L19, Al)

691-L. Some Investigations on Black Oxide Finishes. H. Silman and B. E. Love *Journal of the Electrodepositors' Technical Society,* v. 25, 1950, p. 65-75; discussion, p. 75-76. (Preprint.)

Finishes produced from a solution of NaOH, $NaNO_3$, and $Na_2C_2O_7$. Methods of measuring film thickness. Protective value to Ni-Cr and plain carbon steels. Coating consisted of Fe_3O_4. (L14, AY, CN)

692-L. (Book) **Protective Coatings for Metals.** J. W. Gailer and E. J. Vaughan. 261 pages. 1950. Charles Griffin & Co., Ltd., London. 24s net.

Chemical and physical properties, durability and inspection as well as mode of formation under each type of coating. Two main sections covering metallic and nonmetallic coatings, supplemented by appendices on inspection methods and by tables. (L general)

693-L. (Book) **Enameling on Copper and Other Metals.** Thomas E. Thompson. 1950, 38 pages. Thomas C. Thompson Co., 1205 Deerfield Rd., Highland Park, Ill. $1.00.

Tools and equipment used in enameling, preparation of the enameling metal, enamel application, and firing and finishing. The standard forms of art enameling. Short bibliography. (L27, Cu)

694-L. MHC. *Light Metal Age,* v. 8, Aug. 1950, p. 18, 20.

Although the electrochemical hard-

coating process described is being applied on a purely experimental basis by the Martin Aircraft Co., promise for a new field of use for Al is indicated. (L17, Al)

695-L. Ceramics at Battelle Memorial Institute. *American Ceramic Society Bulletin,* v. 29, July 1950, p. 262-265; Aug. 1950, p. 300-302; Sept. 1950, p. 322-324.

July issue: Method of operation of Battelle; facilities and research programs in raw materials and in materials processing and fabrication. Aug. issue: Work on whiteware, porcelain enamels, ceramic coatings for metals, refractories, and abrasives. Sept. issue: Contributions of other departments such as welding, fuels, nonferrous metallurgy, engineering economics, electrochemistry, and the library to ceramics research at Battelle. (L27)

696-L. A High Temperature Porcelain Enamel for Tungsten. John C. Horsfall. *American Ceramic Society Bulletin,* v. 29, Sept. 1950, p. 314-315.

Previously abstracted from *Enamelist.* See item 588-L, 1950. (L27, W)

697-L. Metallized Paper for Capacitors. D. A. McLean. *Proceedings of the I.R.E.,* v. 38, Sept. 1950, p. 1010-1014.

In metallized paper capacitors, the usual metal foil is replaced by a thin layer of metal evaporated onto the surface of the paper. Lacquering the paper prior to metallizing increases the dielectric strength and insulation resistance, reduces atmospheric corrosion of the metal, and diminishes rate of loss of electrode metal by electrolysis. Owing to extreme thinness of the metal layer, these capacitors are subject to a type of failure not ordinarily found in conventional capacitors. This consists of loss of electrode by electrolysis and occurs under d.c. potential when ionic conductivity is high. (L25, T1)

698-L. Uses of Flame Sprayed Polysulfide Coatings and New Methods of Application. Elliott A. Bukzin. *Rubber Age,* v. 67, Sept. 1950, p. 681-684.

Recommended procedures for preparation of metallic surfaces and application of Thiokol-type coatings, especially for ship components. How poor surface preparation may result in rapid failure of the coating. (L26)

699-L. "Full Polishing" Stainless Sheets Eliminates Trimming Loss. *Steel,* v. 127, Oct. 2, 1950, p. 86.

Improved method of holding work on polishing machine table which makes it possible to polish the full surface of sheets and plates up to 49 in. wide and 14 ft. long. (L10, SS)

700-L. Mill Roll Blasting Reduces Operating Costs. Gilbert D. Dill. *Steel,* v. 127, Oct. 2, 1950, p. 98, 101-102.

Faster, more efficient mechanical processing methods incorporated in special American Wheelabrator machines reduce costs of etching roll work faces. (L10)

701-L. Finishes Successfully Baked on Nonferrous Products by Induction Heating. Frank Netschert. *Materials & Methods,* v. 32, Sept. 1950, p. 60-61.

Baking and curing synthetic enamel finishes on Al and brass builders' hardware products. (L26, Al, Cu)

702-L. Developments in Galvanizing. F. G. White. *Journal of the American Zinc Institute,* v. 28, 1950, p. 57-60. (L16, Zn)

703-L. A Report on Some New Zinc Coatings. A. E. Chester. *Journal of the American Zinc Institute,* v. 28, 1950, p. 61-73.

Advantages and disadvantages of various new and old electrolytic and dip processes for Zn coating of iron and steel. Results of 6-year research program of Azed, Inc., on several of the processes. Advantages of single-phase and two-phase processes developed for chromate protection of electrodeposited or hot-dipped Zn coatings. 21 ref. (L16, Zn, ST)

704-L. Prevention of Black Iron Oxide Deposits Following Chemical Cleaning. P. H. Cardwell. *Proceedings of the Midwest Power Conference,* v. 12, 1950, p. 147-158.

Chemical cleaning process and the resulting formation of black iron oxide film which is sometimes heavy and spotty. Investigation of film formation and methods for its control. (L12, R2, ST)

705-L. The Protective Value of Zinc Coatings. *Engineering & Chemical Digest,* v. 2, July 1950, p. 236-241. (Condensed from Z.D.A. Technical Memorandum, No. 11.)

How Zn and Zn-coated iron behave on atmospheric exposure and how Zn coatings protect iron and steel. Need for uniformity of thickness, effects of Fe in Zn coatings, "white rust" (basic Zn carbonate) and its formation, various ways to apply Zn coatings, and recommended thicknesses. (L16, R3, Zn, ST)

706-L. First International Conference on Hot-Dip Galvanizing. *Sheet Metal Industries,* v. 27, Sept. 1950, p. 773-804.

Comprehensive report. Lengthy abstracts of papers; reports on discussion. (L16, Zn, ST)

707-L. The Alkaline Earth Plumbates as Paint Pigments. N. J. Read. *Journal of the Oil & Colour Chemists' Association,* v. 33, July 1950, p. 295-309; discussion, p. 309-311.

Similarities between the chemical structures, characteristics, and methods of preparation of the alkaline-earth plumbates and red lead. The former appear to be cathodic inhibitors. Accelerated weathering trials show calcium plumbate paint to have anti-corrosive and anti-blistering properties of an unusually high order when used as a primer for iron and steel, particularly under conditions of saltwater immersion. (L26, ST)

708-L. Use of Aluminium in Hot-Dip Galvanizing. M. L. Hughes. *Journal of the Iron and Steel Institute,* v. 166, Sept. 1950, p. 77-84.

Contradictory views expressed in the literature on the subject of Al additions in hot-dip galvanizing. Experiments to determine the minimum amount of Al needed to eliminate alloy layers or to reduce these to such an extent that adequate bonding is obtained. Four steels were tested under various dipping conditions. The present work was limited to short immersion times and to the normal range of operating temperatures. Current theories on the mechanism by which alloy-free coatings are produced from baths containing Al are shown to be incorrect. 39 ref. (L16, Zn, CN)

709-L. Relationship Between Form and Deposition Conditions for Electrolytically Grown Metal Crystals. III. Formation of Field-Oriented Block Structures in Isolated Crystals. (In German.) Hellmut Fischer. *Zeitschrift für Metallkunde,* v. 41, May 1950, p. 151-158.

Effects of greatly increased inhibition and current densities on crystal growth. 12 ref. (L, M)

710-L. Production and Repair of Tools by Autogenous Deposition of Wear-Resistant Materials. (In German.) J. Kunz and H. Jansen. *Schweissen und Schneiden,* v. 2, June 1950, p. 137-146.

Extensive tabulated data on electrode materials; their compositions, structure, properties; and specific uses. Necessary preparations and procedures for making and repairing tools, such as preheating, annealing, welding, grinding, hardening, and tempering. 16 ref. (L24, K1, T5, ST, TS, SG-m)

711-L. The Mode of Action of Pickling Inhibitors. (In German.) F. Willems. *Werkstoffe und Korrosion,* v. 1, June-July 1950, p. 239-244.

Long-term experiments made to determine the effects of different inhibitors in H_2SO_4 solutions. Composition of pickling solutions, type and amount of inhibitor are not revealed. (L12, ST)

712-L. Protection Against Corrosion by Spraying. (In German.) I. C. Fritz. *Werkstoffe und Korrosion,* v. 1, June-July 1950, p. 261-263.

The practice of spray coating metals with other metals and plastics; advantages and disadvantages and methods of improvement. (L23)

713-L. Dry-Cell Rectifier for Use in the Electroplating Industry. Research on the Effect of "Curve Forms" of the Bath Current on Deposit and Current Yield. (In German.) Julius Steiner. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 54, July 1950, p. 307-314.

Effect of a.c. components superimposed on d.c. on structure of electrodeposits and current yield was investigated. The experiments were made with a.c., half-wave and full-wave rectified; with acid Cu, Ni, and Zn baths; and with cyanide Cu baths. (L17, Cu, Ni, Zn)

714-L. The Sodium Hydride Process and Its Application to the Cleaning of Moulds for the Glass Industry. N. L. Evans. *Journal of the Society of Glass Technology* (Transactions Section), v. 34, Apr. 1950, p. 55-59; discussion, p. 59-62.

Cleaning and descaling of metal molds by sodium hydride is said to be speedy and to be free of attack on the base metal. Apparatus and procedure. (L12, CI, ST)

715-L. Contribution to the Study of Electropolishing. (In French.) R. Audubert, M. Bonnemay, and E. Lewartowicz. *Journal des Recherches du Centre National de la Recherche Scientifique,* no. 12, 1950, p. 139-147.

Mechanism of electropolishing was investigated with emphasis on the study of anodic overvoltage. The experimental work was done on electropolishing of stainless steel. (L13, SS)

716-L. Contribution to the Study of Electrolytic Zinc Plating. (In French.) Jean Ginguené. *Métaux & Corrosion,* v. 25, June 1950, p. 156-163.

Influence of cyanide in the bath. (L17, Zn, CN)

717-L. Electrolytic "Siliconizing" of Steels. (Cementation.) (In French.) M. Dodero and P. Blum. *Revue de Metallurgie,* v. 47, July 1950, p. 544-546.

Method, indicating basic principles and technique of operation. Data for a typical run, showing optimum conditions for the specific case. 11 ref. (L15, ST)

718-L. Rapid Determination of Thickness and Continuity of Oxide Layers. (In French.) Carlo Sonnino. *Revue de l'Aluminium*, v. 27, July-Aug. 1950, p. 283.

Two rapid and simple methods for control of the anodizing treatment on aluminum. (L19, Al)

719-L. Modern Finishing Setup in Small Metal Products Plant. John T. Lipford. *Industrial Finishing*, v. 26, Sept. 1950, p. 26-28, 30, 32, 37-38.

Procedures and equipment of Modern Metal Products Co., Greensboro, N. C., for paint finishing metal display and service cabinets for auto service stations. (L26)

720-L. Electronic Equipment Finished in Black and Gray Wrinkle. Alvin N. Haas. *Industrial Finishing*, v. 26, Sept. 1950, p. 42-44.

Equipment and procedures of Bud Radio, Inc. Operations include vapor degreasing formed metal parts and products, prime coating by conveyer dipping, baking the prime coat, spraying wrinkle enamel, flash drying, and infrared oven baking. (L26, L12)

721-L. Salt-Bath Chromizing. I. E. Campbell, V. D. Barth, R. F. Hoeckelman, and B. W. Gonser. *Mines Magazine*, v. 40, Sept. 1950, p. 12-16. Reprinted from *Journal of the Electrochemical Society*, v. 96, Oct. 1949, p. 262-273.

See abstract of condensed version from *Iron Age*, item 18B-95, 1949. (L15, Fe)

722-L. Coating of Steel With Aluminum. S. L. Case. *Steel Processing*, v. 36, Sept. 1950, p. 435-439, 451.

One of a series of articles based on a book now in preparation: "The Alloys of Iron and Aluminum", by S. L. Case and Kent R. Van Horn. (Alloys of Iron Monograph Series.) Calorizing (a diffusion-coating process); hot-dip coatings; Aluminizing; and other methods. Al-Fin process for bonding Al or its alloys to steel or cast iron. 12 ref.
(L general, ST, Al)

723-L. Practical Methods for Finishing Magnesium Die Castings. *Die Castings*, v. 8, Sept. 1950, p. 41-44; Oct. 1950, p. 51, 53-54, 60, 78-79.

Reviews the above. 11 ref.
(L general)

724-L. Surface Preparation; Preparation of Metals for Organic Finishes. Alfred Douty. *Organic Finishing*, v. 11, Sept. 1950, p. 16-21, 25.

Recommended procedures.
(L26)

725-L. Automatic Methods for Organic Finishing. Jerome L. Bleiweis. *Organic Finishing*, v. 11, Sept. 1950, p. 45, 47-49.

Described and illustrated. (L26)

726-L. Tumble Finishing. John E. Hyler. *Organic Finishing*, v. 11, Sept. 1950, p. 51-55.

Surveys the above. (L10)

727-L. Centrifugal Finishing. John E. Hyler. *Organic Finishing*, v. 11, Sept. 1950, p. 57-60.

Surveys equipment and procedures. (L10)

728-L. Electrostatic Spraying Process. Emery P. Miller. *Organic Finishing*, v. 11, Sept. 1950, p. 61-62.

Surveys equipment and procedures. (L26)

729-L. The Electroplating of Metallic Selenium. A. Von Hippel and M. C. Bloom. *Journal of Chemical Physics*, v. 18, Sept. 1950, p. 1243-1251.

The polymorphism of Se; Se ions in selenious acid solution; cathodic deposition as the amorphous and metallic phase, nucleation characteristics and crystal growth of the metallic modification; properties of various types of plating baths; a Se-C anode for the stabilization of bath composition; and finally a number of influences affecting crystallization habit of the deposit. 25 ref. (L17, Se)

730-L. Mechanical Scaling of Low Carbon Steel Rods; French Method Described. *Wire Industry*, v. 17, Sept. 1950, p. 749, 751.

Diagrams, illustrations, and operating data. (L10, CN)

731-L. The Application of Standard Test Methods. F. A. Petersen. *Finish*, v. 7, Oct. 1950, p. 30-33, 68.

Test results from an industry-wide research program and their correlation with "home use" tests for enameled utensils. (L27, CN)

732-L. Selection of Protective Coatings for Chemical Fume Resistance. Clarence C. Harvey. *Corrosion* (Technical Section), v. 6, Oct. 1950, p. 323-326.

Need for coatings to meet specific fume conditions, such as exposure to SO_2, SO_3, H_2, N oxides, Cl, and HCl in chemical plants, refineries, paper plants, and other corrosive environments. (L general, R3, R9)

733-L. Halides as Acid Pickling Inhibitors. Karl F. Hager and Morris Rosenthal. *Corrosion* (Technical Section), v. 6, Oct. 1950, p. 344-346.

Investigations of the mechanism of retardation and acceleration of acid pickling of ferrous metals by addition of halogens and halides. Inhibition was found to increase with increase in atomic weight of

the halogen atoms. Rate of oxide removal on rusted ferrous-metal surfaces was not noticeably affected. Tests on mild steel show that further research on use of halides as pickling inhibitors is warranted. (L12, CN)

734-L. Ceramics. John H. Koenig and Robert H. Thomas. *Industrial and Engineering Chemistry,* v. 42, Oct. 1950, p. 1961-1970.

Developments during the past year in a number of different types of ceramics, enamel and glass products, whitewares, refractories, and structural claywares. Includes porcelain enameling. 87 ref. (L27)

735-L. Which Coating for Gray Iron? Charles O. Burgess. *Product Engineering,* v. 21, Oct. 1950, p. 103-110.

Advantages and disadvantages of the various nonmetallic coatings for gray cast iron. Includes organic finishes, porcelain enamels, chemical conversion coatings, cement lining and armor. (L14, L26, L27, CI)

736-L. Atomic Hydrogen for Hard Facing. *Industry & Welding,* v. 23, Oct. 1950, p. 32.

Use in application of WC to oil-drilling tools. (L24, W, C)

737-L. West Coast Range Plant Grows on a "Try It and See" Formula. *Ceramic Industry,* v. 55, Oct. 1950, p. 90, 93-94, 96, 122, 126.

Equipment and procedures of Western Stove Co., Culver City, Calif., and Waco, Texas, with emphasis on porcelain-enameling and auxiliary processes. (L27, T10, CN)

738-L. Surface Preparation for Anti-corrosive Coatings. C. G. Munger. *World Oil,* v. 131, Oct. 1950, p. 174-177.

Effects of various surface impurities, and common methods for preparing surfaces for corrosion protection. Refers only to ferrous materials. (L general, Fe)

739-L. Modern Metal Finishing—A Science. Harvey Shaw. *Iron Age,* v. 166, Oct. 5, 1950, p. 90-93.

Modern cleaning and finishing systems for space heaters at Coleman Co., Wichita, Kan. (L general, ST)

740-L. Power Brushing Deburrs Gears Ten Times Faster. R. O. Peterson. *Steel,* v. 127, Oct. 9, 1950, p. 80-81.

New semi-automatic workpiece holder and brushing lathe set-up which finishes gears and other similar products on a fast, high-quality production-line basis. (L10)

741-L. Effect of Bath Composition on Aluminum Coatings on Steel. D. O. Gittings, D. H. Rowland, and J. O. Mack. *American Society for Metals,* Preprint No. 3, 1950, 20 pages.

Sb, Be, Bi, Cd, Ca, Cr, Co, Cu, Ge, Pb, Mg, Mn, Ni, Si, Ag, Sn, Ti, V, and Zn were added individually in various amounts to experimental hot-dip Al-coating baths for rimming and low-carbon steels. Their effects on layer thickness, microhardness, flat-bend-test performance, and appearance. 19 ref. (L16, ST, CN, Al)

742-L. Molybdenum Plating by Reduction of the Pentachloride Vapor. W. J. Childs, J. E. Cline, W. M. Kisner, and John Wulff. *American Society for Metals,* Preprint No. 8, 1950, 17 pages.

Properties of the resulting plate. Effect of interfusion between Mo and carbon steel and Ni-base metals on adhesion. 12 ref. (L25, Mo, Ni, CN)

743-L. Conveyorized Setup Expedites IBM Finishing. Herbert Chase. *Products Finishing,* v. 15, Oct. 1950, p. 10-18, 20.

Equipment and procedures for finishing business-machine parts in steel, cast iron, die-cast Zn, and Al. All undergo spray-phosphatizing treatment, and a large proportion receive synthetic primer and wrinkle enamel. (L14, L26, T10, ST, CI, Zn, Al)

744-L. Uniformly Coated Electrolytic Tin Plate Assured by New Plating Thickness Meter. *Products Finishing,* v. 15, Oct. 1950, p. 20, 22.

Instrument developed at Research Laboratory of Carnegie-Illinois Steel Corp. (L17, S14, Sn, CN)

745-L. Modern Masking Materials and Methods for Fabrication and Spray Finishing. Part III. Metal Shields and Electroformed Masks. Arthur P. Schulze. *Products Finishing,* v. 15, Oct. 1950, p. 26-34.

Mainly as applied to painting of automotive parts. (L26, L18)

746-L. Spotlighting Finishing Progress. Allen G. Gray. *Products Finishing,* v. 15, Oct. 1950, p. 44, 46, 48, 50, 52, 54, 56, 58, 60, 62.

Reviews recent work on corrosion of composite electroplated coatings (separate papers by J. E. Stareck, W. A. Esley, and H. A. Pray); adherence tester for organic finishes (C. J. Rolle and T. L. Dietrich); and Pd plating baths for heavy deposits (E. M. Wise and R. F. Vines). (L17, L26, R general)

747-L. Self-Regulating Chromium Bath Plates 20 to 80% Faster. A. H. Allen. *Steel,* v. 127, Oct. 16, 1950, p. 98-99.

Advantages and accomplishments of "SRHS" solutions developed by United Chromium, Inc., New York. The baths are "chromic acid solutions with mixed and cooperating acid catalyst radicals in automatically controlled concentration." Catalyst-containing salts are added in dry form. (L17, Cr)

748-L. Bright Zinc Dip Used To Salvage Stripped Die Castings. Guy Schumacher. *Die Castings*, v. 8, Oct. 1950, p. 55-56.

Procedure used by A. C. Gilbert Co. (L16, Zn)

749-L. Dental Company Finds Plating Is Practical on Aluminum Die Castings. *Die Castings*, v. 8, Oct. 1950, p. 58-59.

Procedure used for applying various metals by Weber Dental Mfg. Co., Canton, Ohio. A Zn immersion coating is first applied. (L17, Al)

750-L. Production and Structure of Vapor-Deposited Thin AlAg and AlMg Films. (In German.) A. Boettcher. *Zeitschrift für angewandte Physik*, v. 2, May 20, 1950, p. 193-203.

Experimental deposition. Structures were studied with the aid of X-rays and by means of electrical resistance measurements. From the observed changes, conclusions concerning diffusion processes within the films are reached. 14 ref. (L25, N15, Al, Ag, Mg)

751-L. Contribution to Knowledge Concerning Electropolishing. II. (In Italian.) Roberto Piontelli. *Metallurgia Italiana*, v. 42, June 1950, p. 205-224.

Theory of electropolishing. New concepts are introduced and applied to interpretation of the salient features of the process. 20 ref. (L13)

752-L. (Book) Die Phosphatierung; Wissenschaftliche Grundlagen und Technik. (Phosphating; Scientific Fundamentals and Industrial Practices.) Willi Machu. 306 pages. 1950. Verlag Chemie, G.m.b.H., Bergstrasse, Weinheim, Germany.

Fundamental and practical aspects of phosphate coating of metals, bringing up to date progress of the last ten years. Also development of processes for phosphate coating by short-time immersion, or by spraying at room temperature, and applications to cold drawing of metals and to reduction of friction between parts. Over 900 references including numerous English-language ones. (L14, G21)

753-L. Mica-Base Paint System Doubles Transformer Tank Life. J. G. Ford and A. J. Kuti. *Steel*, v. 127, Oct. 30, 1950, p. 56-58.

Three-coat baking-type finish developed for distribution transformers which withstands widely diverse atmospheric conditions. Mica flakes are used in an alkyd-resin vehicle. (L26, ST)

754-L. Elgin Steel Kitchen Cabinets Finished in Conveyorized System. *Industrial Heating*, v. 17, Oct. 1950, p. 1796-1798, 1802, 1804, 1806-1808. (L26, T10, CN)

755-L. Conveyorized Blasting Unit Provides Economical Cleaning. Victor E. Hillman. *Foundry*, v. 78, Nov. 1950, p. 204, 206. (L10)

756-L. Chromium Is Plated Directly on Aluminum by New Process. T. C. Du Mond. *Materials & Methods*, v. 32, Oct. 1950, p. 56-57.

How wear resistance and antifrictional qualities of many Al parts can be improved by Cr plating. The Al to be plated is wet blasted by an abrasive suspended in water. After being blasted, the surface retains a coating of the suspension thick enough to prevent any action by air, before immersion in the plating bath. (L17, Cr, Al)

757-L. Research Shows How Pickling Causes Brittleness in Stainless Steels. Carl A. Zapffe. *Materials & Methods*, v. 32, Oct. 1950, p. 58-62.

Reviews fundamental studies on the behavior of gases in steel which have resulted in a better understanding of the difficulties encountered in pickling and have suggested ways of avoiding failures. (L12, Q23, SS)

758-L. Dow Draws Conclusions From Three-Year Paint Study. Otto K. Sieplein. *Chemical Engineering*, v. 57, Oct. 1950, p. 110-115.

Essential conclusions of 3-year test program conducted by Dow Chemical Co. in cooperation with Sherwin-Williams. Over 1700 specimens were exposed to highly corrosive marine atmospheres containing high concentrations of a wide variety of chemical fumes. Pigments, finish coats, and primers were evaluated. The finishes were applied to sand blasted steel panels or to sand blasted areas of chemical tanks and other equipment. (L26, R3)

759-L. Preparing Metal Surfaces for Painting. Edwin Lacy. *Industrial Finishing*, v. 26, Oct. 1950, p. 24-26, 28.

Application of acid phosphate solutions in automatic mechanical spray-washing machines. (L14, L26)

760-L. Process Development Section of G-M Corporation Saves Thousands. R. J. Emmert. *Machine and Tool Blue Book*, v. 46, Nov. 1950, p. 73-76, 78-79, 82.

Two of the problems solved are shot blasting and shot cleaning, and welding of nuts to sheet metal. In the latter, an automatic feed device is fitted to a standard spot welder. (L10, K3, ST)

761-L. Continuous Observations With the Electron Microscope on the Formation of Evaporated Films of Silver, Gold, and Tin. T. A. McLauchlan, R. S. Sennett, and G. D. Scott. *Canadian Journal of Research*, v. 28, sec. A, Sept. 1950, p. 530-534.

Special specimen holder for evaporation of metals within an RCA-EMU electron microscope, which provides continuous observations on growth of films of metal. Micrographs illustrate formation of the films. Results confirm the usually accepted assumptions regarding formation of nuclei and growth of aggregates. 11 ref. (L25, M21, Ag, Au, Sn)

762-L. German Plating and Finishing Described. *Iron Age*, v. 166, Nov. 2, 1950, p. 98. Based on paper by R. Springer.

Developments in Germany during 1940-1950. (L general)

763-L. Test of Bonded Bi-Metallic Piston. *SAE Journal*, v. 58, Nov. 1950, p. 80. Based on "Bi-Metallic Pistons", by Charles E. Stevens, Jr.

The problem of making a bonded bi-metallic piston, or an Al piston having a ferrous member cast and bonded in place to receive one or more ring grooves, has been one of developing a technique which would permit the casting to cool to room temperature without bond failure. A solution to this problem was reached by using high-Ni cast irons having a high coefficient of expansion. Comparison of an all-Al piston shows that ring groove wear is greatly reduced by use of a ferrous insert. (L22, T7, CI, Al)

764-L. Zinc Plating for Corrosion Resistance and Decorative Purposes. S. R. Goodwin. *Electroplating and Metal Finishing*, v. 3, Oct. 1950, p. 524-528.

Protective value of electrodeposited zinc, preparation of base metal, zinc plating solutions, bright zinc solutions, and corrosion resistance of bright zinc. (L17, R general, Zn)

765-L. Intrinsic Porosity. Part Two. *Electroplating and Metal Finishing*, v. 3, Oct. 1950, p. 529-530.

In the first part it was shown that extremely fine porosity is inevitable in a very thin electrodeposit. This installment: Use of addition agents and water-displacing fluids and effect on porosity of plating conditions. (L17)

766-L. Notes on the Drying of Plated Components. C. D. Leonard. *Electroplating and Metal Finishing*, v. 3, Sept. 1950, p. 483-486; Oct. 1950, p. 531-534.

Drying with sawdust, centrifugal drying, and use of water-displacing fluids. Practical hints. (L17)

767-L. Nickel Plated Wire Now Can Be Cold Drawn. *Steel*, v. 127, Nov. 6, 1950, p. 86.

New development of Kenmore Metals Corp., Jersey City, N. J. Ni is plated directly on the steel wire without any intermediary deposit. Thickness of the coating may be as high as 0.002 or 0.003 in. The plating has no adverse effect on the drawing process. Ni has also been plated on Cu wire and on Dumet, a 42% Ni iron wire. Applications are cited. (L17, T general, Ni, CN, Cu, Fe)

768-L. The Application of Marine Paints to Exterior Steel. Rick Mansell. *Organic Finishing*, v. 11, Oct. 1950, p. 15-18.

Recommended procedures for application to various ship surfaces. Paint compositions, including those for antifouling. (L26, T22, CN)

769-L. Kawneer Enamels Aluminum for Profit. *Ceramic Industry*, v. 55, Nov. 1950, p. 54-57, 113.

Details of process and equipment. Unsolved problems include warpage and need for extreme care in metal pickling. (L26, Al)

770-L. A 72-Inch High Vacuum Evaporator and Its Glow Discharge Equipment. Nels C. Benson, Georg Hass, and Noel W. Scott. *Journal of the Optical Society of America*, v. 40, Oct. 1950, p. 687-690.

Evaporator constructed primarily for applying SiO-protected Al coatings to 60-in. searchlight reflectors. Studies made to determine optimum shape, size, and position of the glow-discharge cathode for obtaining uniform heating and consequent cleaning of mirror forms. (L25, Al)

771-L. The Potential for the Hot-Spray Lacquer Process. J. B. Wiesel. *American Paint Journal*, v. 35, Nov. 13, 1950, p. 58, 60, 62. (L26)

772-L. Ductile, Mirror-Bright Copper Plate From Acid Sulfate Baths. Part I. Initial Research and Brightener Preparation. C. J. Slunder, A. E. Bearse, and C. L. Faust. *Plating*, v. 37, Oct. 1950, p. 1040-1044, 1060.

Patents of Henricks and of Beaver on use of organic sulfonation products in acid sulfate baths for production of bright, ductile Cu. Experimental work which was done to define the specific composition and

operating conditions for reproducing the Henricks-type bright plating operation. Use of a series of related compounds as brighteners was investigated. (L17, Cu)

773-L. Production Barrel Plating With Nickel Fluoborate Solution. R. J. O'Connor. *Plating,* v. 37, Oct. 1950, p. 1045-1046, 1056.

Results of production tests on above solution, previously investigated on a laboratory basis. Numerous advantages were confirmed. (L17, Ni)

774-L. Plating With Rhodium and Palladium. Karl Schumpelt. *Plating,* v. 37, Oct. 1950, p. 1052-1056.

Correlates literature. Preparation and composition of solutions, plating conditions, and methods of bath analysis. 27 ref. (L17, Rh, Pt)

775-L. Specifications for Electrodeposited Coatings; Their Purposes and Importance. Clarence H. Sample. *Plating,* v. 37, Nov. 1950, p. 1140-1142.

Types of specifications and importance of tests, early uses of specifications, ASTM-AES specifications, and other specifications. 25 ref. (L17, S22)

776-L. Polishing and Buffing. James H. Lindsey. *Plating,* v. 37, Nov. 1950, p. 1143-1148.

Review of articles and papers published during 1944-1948. Every effort was made to avoid modification or editing of the opinions expressed by the authors. Manufacturers' literature is excluded. 60 ref. (L10)

777-L. Ductile, Mirror-Bright Copper Plate From Acid Sulfate Baths. Part II. Pilot-Plant Operation and Application. Wm. H. Safranek, E. L. Combs, and C. L. Faust. *Plating,* v. 37, Nov. 1950, p. 1149-1152, 1161.

Application of the three individual addition agents described in Part I to bright and semibright plating. Practicable control methods based on data obtained during pilot-plant operation. The procedures are adaptable to commercial plating of bright copper having mirrorlike color and heretofore unequalled properties. Savings are visualized by bright Cu plating before bright Ni plating. (L17, Cu)

778-L. Effect of Impurities and Purification of Electroplating Solutions. I. Nickel Solutions. 4. The Effects and Removal of Copper. D. T. Ewing, Robert J. Rominski, and William M. King. *Plating,* v. 37, Nov. 1950, p. 1157-1160.

Data show the resulting change in certain physical properties of the electrodeposited nickel. (L17, Ni)

779-L. Unique Conception of Job Enameling Plant. Walter Rudolph. *Products Finishing,* v. 15, Nov. 1950, p. 14-18, 20, 22.

Equipment and procedures of Ervite Corp., Erie, Pa. Unique aspects are mainly in materials handling. (L27, ST)

780-L. Practical Notes on Decorative Chromium Plating. Jerome L. Bleiweis. *Products Finishing,* v. 15, Nov. 1950, p. 24, 26, 28, 30, 32, 34, 36.

Some of the problems usually encountered, and precautions to be observed, as well as steps to eliminate the difficulties. (L17, Cr)

781-L. Modern Masking Materials and Methods for Fabrication and Spray Finishing. (Concluded.) **Part IV. Liquid Masking Materials and Peelable Plastic Coatings.** Arthur P. Schulze. *Products Finishing,* v. 15, Nov. 1950, p. 44-55, 58-60, 62.

21 references. (L26)

782-L. Spotlighting Finishing Progress. Allen G. Gray. *Products Finishing,* v. 15, Nov. 1950, p. 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88.

Extensive summaries of two papers. First, "High Temperature Heat Resistant Coatings", by R. A. Williams, I. H. Lutz, and W. H. Hayne: Development of compositions which are capable of withstanding prolonged exposure to temperatures above 800° F. The primer coat contains Zn, Al, and Cd dispersed in phenolic varnish; the finish coat contains Al, a silicone, and glyceryl phthalate. Single-coat blue and olive-drab coatings for stainless steel were also developed. Second paper, "Metal Cleaner Efficiency", by Edwin C. Rinker: Recommended procedures for selection of equipment and cleaning solutions; tests for evaluation of the solutions. (L14, L12)

783-L. On the Principles of Electrodeposition of Metal Powders. G. Wranglen. *Engineers' Digest,* v. 11, Oct. 1950, p. 355-358, 372.

Previously abstracted from *Transactions of the Royal Institute of Technology.* See item 573-L, 1950. (L17, Cd, Cu, Fe, Ni, Zn)

784-L. Plating Experiments With Aqueous Solutions at High Temperatures. Seymour Senderoff and Abner Brenner. *Journal of the Electrochemical Society,* v. 97, Nov. 1950, p. 361-366.

Aqueous solutions of salts of Cr, Cu, Mo, Ni, Ti, W, V, and Zr were electrolyzed under pressure at temperatures up to 300° C. Under these conditions, intermediate reduction steps were favored over reduction to metal. Instability of the solutions was frequently encountered but anodic processes were improved in some instances. (L17, L19)

785-L. Finishing Operations on Springs. *Machinery* (London), v. 77, July 13, 1950, Supplementary issue, p. 61-67 (Date on cover: Sept. 28, 1950.)

Problems involved in the finishing of springs. Methods of finishing both steel and nonferrous metal springs similar to those used for other metal components. Use of pre-coated wire, electroplating, hydrogen embrittlement, phosphate treatments, shot peening, and design of springs in relation to subsequent finishing. (L general, G23, T7)

786-L. Plating by Vacuum Evaporation. J. Lomas. *Machinery Lloyd* (Overseas Edition), v. 22, Oct. 14, 1950, p. 87-89, 91.

The process and its applications. (L25)

787-L. A New Way To Metallize. H. N. Acker. *Canadian Metals,* v. 13, Oct. 1950, p. 38, 48.

Schori gun process and applications. (L23, T general)

788-L. On the Capacity of Porous Aluminum Oxide Layers. A. J. Dekker and Helen M. A. Urquhart. *Canadian Journal of Research,* v. 28, sec. B, Sept. 1950, p. 541-550.

Porous Al_2O_3 layers may be obtained by anodic oxidation in H_2SO_4. The base of the pores is separated from the metal by a thin insulating barrier layer. Experiments show that ultimate thickness of this layer remains constant after a critical value has been reached. Dependence of final thickness on current density, concentration, and temperature. 12 ref. (L19, Al)

789-L. Anodised Aluminium. C. M. Daftary. *Transactions of the Indian Institute of Metals,* v. 1, Apr. 1949, p. 175-178; discussion, p. 178-179.

Anodizing process for protecting Al alloys against corrosion. (L19, Al)

790-L. Maintenance by Welding. M. Riddihough. *Transactions of the Indian Institute of Metals,* v. 3, 1949, p. 347-357.

Equipment, procedures, and applications. New hard facing alloy compositions. 19 ref. (L24, SG-m)

791-L. German Standards: Phosphating Steel Parts as a Protection Against Corrosion. Directions. (In German.) *Metalloberfläche,* sec. A, v. 4, Sept. 1950, p. 137-140.

Specifications, applications, and processes of phosphating. Testing of articles before and after they are bonderized. (L14, ST)

792-L. Porosity of Galvanic Deposits. (In German.) Richard Erdmann. *Metalloberfläche,* sec. B, v. 2, Sept. 1950, p. 138-140.

Causes, and methods of correcting this defect. (L17)

793-L. Problems in the Technique of Metal Spraying. (In German.) Püschel. *Metalloberfläche,* sec. A, v. 4, Sept. 1950, p. 141-143.

Equipment, materials, protective gases, applications, and repair of worn parts by the metal-spraying process. Special uses of this process which are still in the experimental stage. (L23)

794-L. The Metallurgy of Metal Spraying. (In German.) K. Krekeler. *Metalloberfläche,* sec. A, v. 4, Oct. 1950, p. 151-153.

Equipment and procedure. Photomicrographs show the structures of sprayed metals. Some of their properties. (L23)

795-L. Hard-Surfacing for Aluminum Suggests New Uses for Die Castings. *Die Castings,* v. 8, Nov. 1950, p. 33-34, 40.

MHC process (electrochemical) applied to Al and Al alloys. Use on die castings to provide numerous new applications. (L19, Al)

796-L. Precious Metal Plated Finishes for Die Castings. *Die Castings,* v. 8, Nov. 1950, p. 45-47, 66-68.

Emphasis is on gold plating, although Ag and Rh are also mentioned. Bath compositions are given. (L17, Au, EG-c)

797-L. Blast Cleaning of Forgings Reduces Stream Pollution. Joseph Geschelin. *Automotive Industries,* v. 103, Nov. 15, 1950, p. 48-49, 106.

How use of the Pangborn "Continuous-Flo" Rotoblast machine at Buick has fitted into the current program of reducing stream pollution, by accompanying reduction in the amount of pickling waste. Illustrated. (L10, ST)

798-L. Tin-Zinc Alloy Can Replace Cadmium. *Steel,* v. 127, Nov. 20, 1950, p. 118, 120.

A whole range of tin-zinc alloys can be electrodeposited, but the most desirable one appears to be 80% Sn, 20% Zn, with a tolerance of about 2.5% either way. The plating process and properties of the deposit. (L17, Sn)

799-L. European Trends in General Galvanising; An Outline of Development Work. R. Lewis Stubbs and A. R. L. Chivers. *Metallurgia,* v. 42, Oct. 1950, p. 233-234.

(L16, Zn, CN)

800-L. The Electrolytic Polishing of Zirconium and Its Application to a Study of the Effects of Abrasion Upon the Structure of the Metal. P. A. Jacquet. *Metallurgia,* v. 42, Oct. 1950, p. 268-270.

Technique and results. Includes photomicrographs. (L13, M27, Zr)

801-L. Vapor Deposition of Uniform Thin Layers of Controlled Thickness; Electronic Applications. (In French.) Ch. Dufour. *Vide,* v. 5, July-Sept. 1950, p. 837-843.

Method and apparatus developed by a French television laboratory which permits vacuum deposition of uniform (±1% of desired composition) layers of a thickness as low as 1/50th micron. It is applicable to deposition of both metallic and nonmetallic materials. Various applications. (L25, T1)

802-L. Properties of Metals Deposited by Gun Spraying in Thick Layers. (In French.) J. Grilliat. *Métaux et Industries,* v. 1, no. 1, 1950, p. 14-23.

Physical, chemical, mechanical and structural properties of spray-deposited steel, Cu, bronze, brass, Al, light alloys, Zn, Pb, and their alloys. Deviations of properties from those of the corresponding base metals (cast or hot or cold worked). Photomicrographs and a Debye-Scherrer pattern illustrate structures. (L23, Q general, P general, M27)

803-L. The Participation of Chromium Chloride and Hydrogen in Chromium Plating by Vapor Deposition. (In Russian.) N. G. Klyuchnikov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Sept. 11, 1950, p. 267-269.

During the above method of Cr plating, the chloride is always present in the bivalent state and the plating operation may be performed in an atmosphere of chromium chloride in the absence of ferrochromium. Hydrogen dissolved in the metal also participates in plating process and in some cases increases as much as 5-10 times the absorption of Cr by the base metal. (L25, Cr)

804-L. Electrochemical Method for Determination of Adhesivity of Electrodeposits. (In Russian.) A. T. Vagramyan and Yu. S. Tsareva. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Sept. 11, 1950, p. 303-305.

Method is based on determination of the value of cathodic polarization during the electrodeposition process and establishment of a relationship between the minimum value of polarization for the case of an absolutely pure electrolyte and a very clean cathode surface, and adherence of the deposit. Comparison of data from the bending test with the new test shows close agreement. (L17)

805-L. (Book) **Metallische Ueberzeuge** (Metallic Coatings). Ed. 3. W. Machu. 672 pages. 1948. Akademische Verlagsgesellschaft Geest & Portig K. G., Leipzig, Germany. £3, 10s.

The standard German work on metallic films as applied by various methods. Deals with practically all the metals, and includes data on testing methods. A large number of references as well as a name and subject index are included. (L general)

806-L. Durable Paint System for Transformer Tanks. J. G. Ford and A. J. Kuti. *Industrial Finishing,* v. 27, Nov. 1950, p. 38-40, 42, 45-46, 48, 50, 52, 54.

Previously abstracted from *Steel.* See item 753-L, 1950. (L26, ST)

807-L. New Mica Base Paint System Withstands Severe Atmospheric Conditions. J. G. Ford and A. J. Kuti. *Materials & Methods,* v. 32, Nov. 1950, p. 58-61.

See abstract of "Mica-Base Paint System Doubles Transformer Tank Life," *Steel,* item 753-L, 1950. (L26, ST)

808-L. How To Reduce Pickling Brittleness in Stainless Steels. Carl A. Zapffe. *Materials & Methods,* v. 32, Nov. 1950, p. 74-77.

Use of pickling inhibitors, surface-active agents, a foaming compound (negative results), and molten-caustic pickling. The aging and recovery process for removal of H_2 from steel. Practical application of fundamental principles developed in a previous article (see item 757-L, 1950). (L12, J27, Q23, SS)

809-L. Mechanical Finishing of Metals—for Decorative Purposes. John B. Campbell. *Materials & Methods,* v. 32, Nov. 1950, p. 81-96.

The selection problem. The processes of polishing, buffing, brushing, tumbling, burnishing, and blasting. Finally, the mechanical finishing of carbon and stainless steel, aluminum, magnesium, copper, nickel, zinc, precious metals, and high-temperature alloys. (L10)

810-L. Wet Tumbling Lowers Deburring Costs. Robert H. Anderson. *Iron Age,* v. 166, Nov. 30, 1950, p. 69-71.

Equipment and procedures of Bendix Aviation Corp. Over 1,000,000 Zn, Al, Mg, and steel parts are deburred and burnished each week. Parts from 1 oz. to 15 lb. are wet tumbled in Roto-Finish barrels. Cost is less, and uniformity higher than with hand burring. (L10, Zn, Al, Mg, ST)

811-L. Surface Protection Via Phosphate Coatings. Melvin G. Crandell. *Canadian Metals,* v. 13, Nov. 1950, p. 30-31, 33, 46-47.

"Bonderite" process for iron, steel,

Zn, Cd, Al, and their alloys. The coating retards corrosion and provides a good base for paints. It is also used to facilitate deep drawing. (L14)

812-L. The Structure of Metallic Electrodeposits; Cathodic Crystal Growth. (In German.) G. I. Finch. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 54, Oct. 1950, p. 457-458.

Illustrated by X-ray diffraction patterns. (L17, L21, M22)

813-L. Relationship Between Shape and Conditions for Electrodeposition of Metallic Crystals. (In German.) **IV. Effects of Impurities on the Formation of Block Structures in Polycrystalline Deposits.** Hellmut Fischer. **V. Effects of Shape and Orientation of the Crystals of the Substrate on Reproduction of the Base.** Hellmut Fischer, Horst Matschke, and Franz Pawlek. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 54, Oct. 1950, p. 459-485.

Part IV. Shows that shape and orientation of the crystals vary with type and concentration of foreign materials present. Formation of five different shape types. Part V: Experiments on deposition of Cu on Cu from an acid $CuSO_4$ solution. Extent of reproduction or adaptation of electro deposit structure to that of the substrate depends mostly on ratio of grain diameter of the deposit to that of the base, and to a lesser extent on grain orientation of the base. (L17, Cu)

814-L. A Bridge Method for the Control of Electrolytic Polishing. L. F. Bates and C. D. Mee. *Journal of Scientific Instruments,* v. 27, Nov. 1950. p. 317-318.

Apparatus and typical data. (L13)

815-L. Precious Metal Plated Finishes for Die Castings. Part Two. *Die Castings,* v. 8, Dec. 1950, p. 39-41, 52. 58-59.

Reviews recent literature on silver plating of die castings. Bath compositions are tabulated. (L17, Ag)

816-L. A Production Line Report: Simple Pretreatment for Weather-Proof Coating. *Die Castings,* v. 8, Dec. 1950, p. 42-43.

Equipment and procedures used to finish die-cast Al components of parking meters. Cleaning, drying and spray-painting. (L26, T8, Al)

817-L. Metallic Surface Coatings for Gray Iron. Charles O. Burgess. *Product Engineering,* v. 21, Dec. 1950, p. 108-113.

Methods of applying metallic coatings to gray iron—for appearance, corrosion, wear or other requirements—include spraying, welding, cementation, diffusion, hard facing, hot dipping, and electroplating. Metallic coatings applied to gray iron include Sn, Zn, Pb, Al, Cr, Ni, Cu, and their alloys. Possibilities of each type of surface treatment and the usual method of application. (L general, CI)

818-L. Boiler Waterside Cleaning. S. Greenberg, J. L. Smith, and A. Howarth. *Journal of the American Society of Naval Engineers,* v. 62, Nov. 1950, p. 835-843.

Scale removal from the interior of boiler tubes by use of various chemicals. Effects of type of inhibitor and acid upon corrosion rates of various types of steel. (L12, R4, ST)

819-L. Research From Abroad. An Analysis of Recent Russian Work and Patents on Metal Finishing. II-III. (Concluded.) *Electroplating and Metal Finishing,* v. 3, Oct. 1950, p. 535-537; Nov. 1950, p. 572-573.

22 references. (L general)

820-L. Urea-Formaldehyde Pickling Inhibitors. *Electroplating and Metal Finishing,* v. 3, Nov. 1950, p. 565.

Some recipes for making up the above—patented by Pennsylvania Salt Mfg. Co. (L12, Fe)

821-L. Bright Nickel Plating; Some Further Udylite Patents Reviewed. *Electroplating and Metal Finishing,* v. 3, Nov. 1950, p. 567-569.

Recent patent literature concerning anti-pitting and other addition agents for bright plating solutions. (L17, Ni)

822-L. Grinding & Polishing of Gold Articles. H. Krause. *Electroplating and Metal Finishing,* v. 3, Nov. 1950, p. 570-571. Translated from *Metalloberfläche,* v. 3, no. 1, 1949, p. 20-21.

Practical recommendations based on German practice. Mechanical, electrolytic, and barrel polishing. (L10, L13, Au)

823-L. Linings for Plating Tanks. *Electroplating and Metal Finishing,* v. 3, Nov. 1950, p. 574-575, 580.

The case for inert linings for steel plating vats. Opinions on the relative merits of the various materials available. (L17, L26)

824-L. Mica-Base Paint System Doubles for Outdoor Exposure. J. G. Ford and A. J. Kuti. *Organic Finishing,* v. 11, Nov. 1950, p. 7-11.

See abstract of "Mica-Base Paint System Doubles Transformer Tank Life", *Steel,* item 753-L, 1950. (L26, ST)

825-L. Surface Preparation Values and Sandblasting Economics. A. J.

Liebman. *Organic Finishing,* v. 11, Nov. 1950, p. 12-18, 21.

Various factors involved in determination of the optimum procedure for surface preparation and paint coating of structural steel. Various methods for surface preparation, their advantages and disadvantages. (L10, CN)

826-L. Why Pretreatment? Philip Heiberger. *Organic Finishing,* v. 11, Nov. 1950, p. 19-21.

Advantages and disadvantages of various surface treatments for metals prior to application of organic finishes. (L26)

827-L. Technique of Applying Porcelain Enamel Cover Coat Directly on Steel. M. E. McHardy. *Refrigerating Engineering,* v. 58, Dec. 1950, p. 1194-1195.

Progress of last 2 years in the single-coat method for finishing refrigerator parts at Hussmann Refrigeration, Inc. (L27, CN)

828-L. Nickel Plating From Fluoborate Solutions. Clifford Struyk and A. E. Carlson. *Plating,* v. 37, Dec. 1950, p. 1242-1246, 1263-1264.

Compares the nickel fluoborate electrolyte and other types of nickel baths. Evaluation procedures used. Buffer characteristics, resistivity, limiting current density, current efficiencies, and throwing power of the solutions; as well as physical properties of, and stress in, the nickel deposits. (L17, Ni)

829-L. Polishing and Buffing. (Concluded.) James H. Lindsey. *Plating,* v. 37, Dec. 1950, p. 1247-1251.

Second part of literature review covers buffing, buffing compounds, and buffing equipment. (L10)

830-L. Grain Size and Hardness of Nickel Plate as Related to Brightness. Harold J. Read and Rolf Weil. *Plating,* v. 37, Dec. 1950, p. 1257-1261.

Shows experimentally that there is no correlation between brightness of Ni deposits and their grain size or hardness. Although there does exist a very broad general trend which indicates that the brightness increases with decreasing grain size and increasing hardness, the specific exceptions are so numerous that they become more significant than the general trend. (L17, Q29, M27, Ni)

831-L. Metallic and Nonmetallic Coatings for Gray Iron. Charles O. Burgess. *Foundry,* v. 78, Dec. 1950, p. 76-79, 194, 196, 198, 202-203.

First of three articles on coatings successfully applied to gray-iron castings on a commercial scale to meet appearance, corrosion, wear, or other requirements. Sprayed-metal and hot-dipped coatings. 34 ref. (L16, L23, CI)

832-L. Coatings Research at Battelle Memorial Institute. E. R. Mueller and B. G. Brand. *Paint and Varnish Production,* v. 30, Sept. 1950, p. 10-12, 20-21.

General organization and procedure for handling research at Battelle. Facilities for coatings research and typical projects. Battelle's North Florida Research Station for study of marine fouling, corrosion, deterioration, etc. 12 ref. (L general, A9, R general)

833-L. Dyed Aluminium Powder. Gunter W. Wendon. *Paint Manufacture,* v. 20, Nov. 1950, p. 397-400.

Procedure for preparation of dyed powder, which resembles ordinary Al flake powder in shape, structure, and particle-size distribution. It differs from it in having a colored surface. General features, practical stages, patented processes, difficulties experienced, leafing power, pigment suitability, methods of application, and future work. (L26, H12, Al)

834-L. Rust Proofing Improved by Polymerized Phosphate Coat. Don Vance. *Western Metals,* v. 8, Nov. 1950, p. 25-26.

Advantages of "Polykote" process developed by Kelite Products, Los Angeles. A catalyst is used to produce polymerization of the phosphate crystals, resulting in continuous rather than discontinuous protection. (L14)

835-L. A Noble Coat of Tin. *Steelways,* v. 6, Nov. 1950, p. 26-27.

Electrolytic tinplate line. (L17, Sn, CN)

836-L. Anti-Corrosion Tape for Service Pipes. George M. Carter, Jr. *Gas Age,* v. 106, Nov. 23, 1950, p. 42-43, 76, 78.

Illustrations show how one gas company protects service pipe against corrosion by use of "Scotch" brand electrical tape No. 22, which consists of a polyvinyl chloride film with a specially developed pressure sensitive adhesive on one side. L26, R10)

837-L. Cobalt Reduction Theory of Sheet Iron Enamels. J. H. Healy and A. J. Andrews. *Finish,* v. 7, Dec. 1950, p. 22-23.

Progress to date in an intensive study of the structure of sheet-iron ground coats and the function of cobalt in the development of adherence. (L27, CN)

838-L. The Synthetic Enamel Department Goes Modern. Russell Wydeen. *Finish,* v. 7, Dec. 1950, p. 25-28.

Metal preparation and synthetic finishing operations for refrigerators and home freezers. (L27, CN)

839-L. Molten Caustic Bath Provides Rapid, Efficient Method of Cleaning Steel Parts for Painting. James E. Fritts. *Products Finishing,* v. 15, Dec. 1950, p. 10-16, 18.

Newly developed prepaint cleaning cycle for steel parts. Equipment and procedures of Ternstedt Div., General Motors Corp., Columbus, Ohio. (L12, ST)

840-L. Plating Without Nickel Chloride. *Products Finishing,* v. 15, Dec. 1950, p. 18, 20, 22.

Possible substitutes for nickel chloride as a source of Cl ions in the plating bath. (L17)

841-L. Filter Out Your Plating Rejects. Ezra A. Blount. *Products Finishing,* v. 15, Dec. 1950, p. 24-36, 38, 40, 42.

Principles and procedures for plating solution clarification, namely the removal of objectionable contaminants either mechanically by filtration or by adsorption on activated carbon. Commercial equipment. 18 ref. (L17)

842-L. Spotlighting Finishing Progress. Allen G. Gray. *Products Finishing,* v. 15, Dec. 1950, p. 48, 50, 52, 54, 56, 58, 60, 62.

Surveys the following: Paper by P. O. Powers on effect on finishes of reactions of resins with drying oils; use of tinplate as undercoat for paint (Tin Research Institute); rhodium plating (E. M. Wise); finishing Be-Cu parts (John T. Richards); silicide coatings for Mo and vapor deposition of refractory coatings (Battelle Institute papers). (L general)

843-L. Maytag Takes on Porcelain Enameling. *Ceramic Industry,* v. 55, Dec. 1950, p. 52-55.

Plant features automatic spray pickling and a special wire-cooling booth at the exit of the furnace. (L27, CN)

844-L. Anodic Treatment of Manufactured Products. (Concluded.) P. Smith and P. Shaw. *Light Metals,* v. 13, Sept.-Oct. 1950, p. 497-500.

Necessity for avoidance of assembly systems or designs which lead to trapping of electrolytes. (L19, Al)

845-L. Aspects of Jobbing Electroplating; Need for Technical Control. A. Whittaker. *Metal Industry,* v. 77, Nov. 10, 1950, p. 184-185. (L17)

846-L. The Nickel Shortage; Maintaining Production Under Present Conditions. C. W. J. Morley. *Metal Industry,* v. 77, Nov. 24, 1950, p. 218-219.

Means of reducing metal losses in the electroplating industry. (L17, Ni)

847-L. Hot-Dip Tinning of Cast Iron. W. E. Hoare. *Foundry Trade Journal,* v. 89, Nov. 23, 1950, p. 411-414, 427.

Principles and methods of surface preparation, including electroplating, chemical oxidation processes, and fluxing. (L16, CI, Sn)

848-L. Evaluation of Underwater Paints for Steel Surfaces. W. Husse. *Paint and Varnish Production,* v. 30, Apr. 1950, p. 7, 13-15.

Results of a study initiated by the German Government in 1936. Because of World War II and the postwar adjustment period, results were not made available until Dec. 1949, when they were given in the form of a report in Berlin. (L26, ST)

849-L. Fast Abrasive Belt Finishing Lops Off Costs. *Steel,* v. 127, Dec. 11, 1950, p. 88-90; Dec. 18, 1950, p. 100-102.

Relatively new method and some of its applications. Cooler, faster cutting is one of its greatest advantages. (L10)

850-L. Sulphuric Acid Cleaning and Coating of Rod and Wire in a Straightline Operation. R. H. Hertzog. *Wire and Wire Products,* v. 25, Dec. 1950, p. 1047-1048, 1079-1082.

Procedures and equipment of John A. Roebling's Sons Co., Trenton, N. J. Material processed is carbon steel. (L12, CN)

851-L. Molten Salt Descaling. H. Clark Smith, Jr. *Wire and Wire Products,* v. 25, Dec. 1950, p. 1050-1051, 1085-1089.

Experiences of Wilbur B. Driver Co., in setting up and operating a molten-salt cleaning bath for descaling of stainless steels and high Ni-Cr alloys. (L12, SS, Ni)

852-L. New Process Slashes Cost of Phosphoric Acid Pickling. C. F. Paulson and M. E. Gilwood. *Iron Age,* v. 166, Dec. 14, 1950, p. 97-99.

New ion-exchange process for reclaiming spent acid. Cost of phosphoric acid pickling can be cut 66%. In many cases, cost will be below that of the less desirable pickling with H_2SO_4. (L12, ST)

853-L. Cleaning and Preparation of Metals for Electroplating. 1. Critical Review of the Literature. Henry B. Linford and Edward B. Saubestre. *Plating,* v. 37, Dec. 1950, p. 1265-1269.

Classifies the various methods in current use. The principles of detergency. Representative electrolytic

and nonelectrolytic cleaning solutions for brass, steel, and Al are tabulated. (To be continued.) (L12, L13)

854-L. Progress in Metal Finishing Since 1929. S. Wernick. *Metallurgia,* v. 42, Nov. 1950, p. 339-344.

An illustrated review. (L general)

855-L. Hydrate Formation During Electrolysis of Nickel. (In Russian.) A. L. Rotinyan and V. Ya. Zel'des. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 23, Sept. 1950, p. 936-941.

Hydrate formation of additions of Cu and tri and bivalent Fe to the Ni electrolyte was studied by means of electrometric-titration curves, glass electrode, and the Tyndall cone. (L17, Ni)

SECTION M

METALLOGRAPHY, CONSTITUTION and PRIMARY STRUCTURES

1M. Distribution of Phases in Two-Phase Solids. Leonard D. Jaffe. *Journal of Applied Physics,* v. 20, Dec. 1949, p. 1206-1208.

The quasi-equilibrium distribution of a disperse phase within a polycrystalline phase was investigated by methods of statistical thermodynamics. (M27)

2M. Method for the Quantitative Evaluation of X-Ray Patterns From Mixed Powders. J. C. M. Brentano. *Journal of Applied Physics,* v. 20, Dec. 1949, p. 1215-1222.

Basic aspects of some interfering factors, in particular of those which result from superpositions of lines. A correction method is developed and is adapted to cases where the impurities which interfere with the regular patterns are unknown. 34 ref. (M22)

3M. Orientation of Single-Crystal Rods of Copper Grown From the Melt. A. A. Petrauskas and F. Gaudry. *Journal of Applied Physics,* v. 20, Dec. 1949, p. 1257-1258.

A large number of crystals were grown and their axes plotted. Orientation was found to have random distribution as predicted by theory. (M26, Cu)

4M. Crystal Structure and Phase Transformations. J. Robert Doig. *Metals Review,* v. 22, Dec. 1949, p. 4-6, 24-25.

Fundamental research reported in the literature of the past year or two. (References to A.S.M. Review of Current Metal Literature.) (M general, N general)

5M. Improved Differential Thermal Analysis Apparatus. J. Laurence Kulp and Paul F. Kerr. *American Mineralogist,* v. 34, Nov.-Dec. 1949, p. 839-845.

Modified type permits automatic pen or dot recording with a sensitivity equal to that of galvanometer-photographic recording methods. With a dual furnace assembly virtually continuous operation alternating between multiple and single recording may be accomplished. (M23, S16)

6M. Investigation of Coarse Grain in Brabazon Spar Booms. *Aircraft Engineering,* v. 21, Dec. 1949, p. 388-389.

Results of etching and tensile tests on Al alloy aircraft parts show superiority of fine-grained material. (M27, T24, Al)

7M. Metallographic Technique. Cornelius A. Johnson. *Frontier,* v. 12, Dec 1949, p. 16-21.

Elementary outline. Includes typical photomicrographs. (M21)

8M. The Aluminium-Tin Phase Diagram and the Characteristics of Aluminium Alloys Containing Tin as an Alloying Element. A. H. Sulley, H. K. Hardy, and T. J. Heal. *Journal of the Institute of Metals,* v. 76, Nov. 1949, p. 269-294.

The liquidus curve of the Al-Sn system and the solid solubility of Sn in Al were redetermined. Results of metallographic examination, aging tests, and precise lattice-parameter measurements. The metallurgy of Sn as an alloying element in Al alloys. Other elements may combine with tin to form a compound and so suppress its normal effects. 35 ref. (M24, Al, Sn)

9M. Electrolytic Polishing; New Apparatus for Rapid Production of Microsections. *Metal Industry,* v. 75, Dec. 9, 1949, p. 493, 501.

Commercial apparatus and method of operation. (M21)

10M. The System Chromium-Carbon. David S. Bloom and N. J. Grant. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Jan. 1950, p. 41-46.

The Cr-C system, up to 20% C, was investigated using metallographic, X-ray, and thermal analyses. Transformation temperatures pertinent to the three known carbides were examined, resulting in higher temperatures than heretofore given for some of these transformations. Many attempts were made, all unsuccessful, to form a carbide of composition CrC. 10 ref. (M24, Cr, C)

11M. A Preliminary Investigation of the Zirconium-Beryllium System by Powder Metallurgy Methods. Henry H. Hausner and Herbert S. Kalish. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Jan. 1950, p. 59-66.

Condition of the specimens after sintering, metallographic examination, and X-ray-diffraction studies revealed enough information to permit construction of a preliminary phase diagram.

(M24, H general, Zr, Be)

12M. Method for Studying Grain Boundary Migration in Aluminum. Philip R. Sperry. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Jan. 1950, p. 103-104.

Technique. (M27, Al)

13M. Faults in the Structure of Copper-Silicon Alloys. Charles S. Barrett. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Jan. 1950, p. 123-135.

Disorders (faults) in the stacking of atomic planes in Cu-Si alloys were detected and analyzed by X-ray diffraction, and the conditions for generating faults determined. They were found in alloys of 4.0-5.4% Si after deformation, when supersaturated. Effects of variations in heat treatment and working. (M26, Cu)

14M. The Alloy Systems Uranium-Aluminum and Uranium-Iron. Paul Gordon and A. R. Kaufmann. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Jan. 1950, p. 182-194.

Phase diagrams were determined. For each system several intermetallic compounds occur. Solid solubility in the terminal phases is very limited in all cases. (M24, U)

15M. The Alloy Systems Uranium-Tungsten, Uranium-Tantalum and Tungsten-Tantalum. C. H. Schramm, P. Gordon, and A. R. Kaufmann. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Jan. 1950, p. 195-204.

Constitutions of the U-W and U-Ta systems and resulting phase diagrams. Relationship between lattice parameter and composition for Ta-W solid solutions. Two phases of the U-Ta-C ternary system were discovered and described. Experimental induction-melting apparatus. (M24, U, W, Ta)

16M. A New Intermetallic Phase in Alloy Steels. K. W. Andrews. *Nature,* v. 164, Dec. 10, 1949, p. 1015.

X-ray examination of a number of residues separated electrolytically from steels containing Cr, Ni, and Mo revealed the presence of a new phase designated as χ. Results of chemical analysis of a residue containing a large proportion of this phase. Debye-Scherrer powder photographs show a structure similar to α-manganese. (M27, M22, AY)

17M. Compounds of Uranium With the Transition Metals of the First Long Period. N. C. Baenziger, R. E. Rundle, A. I. Snow, and A. S. Wilson. *U. S. Atomic Energy Commission,* AECD 2598, May 25, 1949, 15 pages.

Binary metallic compounds formed with Mn, Fe, Co, Ni, and Cu. Occurrences, structure, and composition. 13 ref. (M26, U)

18M. The Crystal Structures of Metallic Uranium. Charles W. Tucker, Jr. *U. S. Atomic Energy Commission,* AECD-2716, July 21, 1949, 14 pages.

The three crystalline forms before melting are: α-phase, stable up to 640° C.; β-phase, stable between 640 and 760° C.; and γ-phase, stable from 760 to the melting point. Some physical properties of the three phases which can be readily interpreted in terms of crystal structure. 10 ref. (M26, U)

19M. The Electron Microscope and Its Application to Metallurgy. (In French.) Adrien Saulnier. *Revue de L'Aluminium,* v. 26, Nov. 1949, p. 355-360.

The electrostatic electron microscope. Techniques of preparation and some of the results recently achieved in the field of Al-Cu alloy hardening. (M21, Al)

20M. Some Applications of Electrolytic Polishing in Micrographic Investigation of Al-Zn and Al-Mg Solid Solutions. (In Italian.) P. Lacombe and A. Berghezan. *Alluminio,* v. 18, July-Aug. 1949, p. 365-377.

Application to study of Al alloys containing 20% Zn and 4% Cu after hardening, aging, and annealing, in an attempt to determine the kinetics of structural hardening. The most important factor was found to be

the arrangement and distribution of crystal imperfections. 23 ref. (M21, M26, N7, Al)

21M. Heat Conduction During Phase Transformations. (In German.) Dietrich Geist and Ulrich Dehlinger. *Zeitschrift für Naturforschung,* v. 4a, Sept. 1949, p. 415-423.

General method for solving the heat-conductivity equation. The computations are used to prove that the laminar structures of metal crystals are not directly related to the heat of solidification. 25 ref. (M23)

22M. Electrolytic Polishing of Metal Surfaces and Its Importance in Microhardness Testing. (In German.) K. Longard. *Archiv für Metallkunde,* v. 3, Nov. 1949, p. 381-386.

The work-hardening effect of mechanical polishing makes it impossible to obtain accurate microhardness data. This difficulty is absent in electropolished specimens. Tests were made to determine the most favorable polishing conditions. (M21, Q29)

23M. The Tin-Oxygen System. (In German.) *Zeitschrift für Metallkunde,* v. 40, Oct. 1949, p. 374-376.

Study shows that SnO decomposes, when heated above 400° C., into solid Sn_3O_4 and molten tin. From a quantitative point of view, the Sn-O constitution diagram is still in approximate form. Several observations on the reduction of SnO_2 with carbon. (M24, Sn)

24M. The Manganese-Chromium System. (In German.) Ulrich Zwicker. *Zeitschrift für Metallkunde,* v. 40, Oct. 1949, p. 377-378.

Constitution diagram on the basis of thermal, metallographic, and X-ray studies. Properties and structures of alloys made of electrolytic Cr and of commercially pure Cr were found to be the same. (M24, Mn, Cr)

25M. The Phase Diagram of the Cobalt-Germanium System. (In German.) Hermann Phisterer and Konrad Schubert. *Zeitschrift für Metallkunde,* v. 40, Oct. 1949, p. 378-383.

Determined on the basis of thermal, microscopic, and X-ray analysis. It includes the four intermetallic phases of Co_2Ge, CoGe, Co_2Ge_3, and $CoGe_2$. 10 ref. (M24, Co, Ge)

26M. The Crystal Structure of the δ High-Temperature Phase of the Copper-Zinc System. (In German.) Konrad Schubert and Erich Wall. *Zeitschrift für Metallkunde,* v. 40, Oct. 1949, p. 383-385.

Investigation of the δ phase was preceded by a study of the effect of temperature on the lattice constants of the γ and ε phases. 14 ref. (M24, Cu, Zn)

27M. Precision Measurement of Constant Crystalline Lattices. (In Russian.) A. Z. Zhmudskii. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Sept. 1949, p. 1055-1061.

Method and apparatus. Satisfactory results were obtained for Fe and Al, indicating that the method is accurate within 2×10^{-3}%. Applicability to the cubic system, to determination of linear coefficient of thermal expansion, and to study of processes connected with small changes of unit-call dimensions. (M26)

28M. Determination of Orientation of Coarse Monocrystals. (In Russian.) Yu. A. Bagaryatskii and E. V. Kolontsova. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Sept. 1949, p. 1062-1071.

Photographic technique known as "reverse exposure". (M26, M23)

29M. Evaluation of the Grain Structure of Metals. (In Russian.) S. A. Saltykov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Sept. 1949, p. 1114-1126.

Indicates shortcomings of ASTM scale and proposes a new approach for evaluation of grain structure of metals, particularly steel. 28 ref. (M27)

30M. Quantitative Microstructural Analysis. (In Russian.) M. E. Blanter. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Sept. 1949, p. 1126-1127.

Further data and defense of method previously described. (M21)

31M. Crystal Structure of In_2Bi. (In Russian.) E. S. Makarov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 68, Sept. 21, 1949, p. 509-510.

Investigated by an X-ray method. Crystallographic constants are indicated and compared with those theoretically calculated. (M26, In, Be)

32M. Electron-Microscopic Investigation of the Structures of Gold Films Formed on the Surfaces of Aqueous Solutions of Metallic Salts by Action of Gaseous Reducing Agents. (In Russian.) N. V. Demenev, N. N. Buinov, and M. I. Milyutina. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 68, Oct. 1, 1949, p. 721-723. (M21, N14, Au)

33M. Investigation of Dispersion of Electrons and Electronographic Study of Structure of Crystals and High Polymers. (In Russian.) Z. G. Pinsker.

Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya (Bulletin of the Academy of Sciences of the USSR, Physical Series), v. 13, July-Aug. 1949, p. 473-485.

Diffraction patterns of various metals and alloys are compared and interpreted. Results indicate wide possibilities of this method of investigation in crystallography, physical chemistry, and metallurgy. 16 ref. (M22)

34M. Polishing Metallographic Specimens With Diamond Dust. H. J. Grenville-Wells. *Industrial Diamond Review*, new ser., v. 9, Dec. 1949, p. 360-363.

Polishing of sintered carbides and polishing of relatively soft metals. Appendix on polishing of mineralogical specimens with diamond dust. 12 ref. (M21)

35M. Characteristics of Metallographic Polishing Powders. E. C. Rollason, E. Sharratt, and R. R. Roberts. *Industrial Diamond Review*, new ser., v. 9, Dec. 1949, p. 364-365. A condensation.

Previously abstracted from *Journal of the Iron and Steel Institute*. See item 11-342, 1949. (M21)

36M. Surface Form of Metal Crystals; Determination by the Electron Diffraction Method. D. W. Pashley. *Metal Industry*, v. 75, Dec. 30, 1949, p. 557-560.

Details of above method, including typical results. (M22, M26)

37-M. Improved Techniques for Examination of Structure. Arthur L. LaMasters. *Metal Progress*, v. 57, Jan. 1950, p. 80.

Procedure for taking full-sized macrographs of large castings. Photomicrographs can then be taken of any desired portions and accurately located for comparison. (M28)

38-M. A New Type of Crystal Goniometer Head. W. A. Rachinger. *Journal of Scientific Instruments and of Physics in Industry*, v. 26, Dec. 1949, p. 411-412.

Apparatus was designed so that large metallic crystals, in the form of flat strip, can be set in such a position that certain high-angle monochromatic X-ray reflections can be obtained. (M23)

39-M. Instrument for Measurement of X-Ray Diffraction Patterns. John A. Bennett. *Review of Scientific Instruments*, v. 20, Dec. 1949, p. 908-910.

Instrument for measuring back-reflection patterns for surface-stress determinations is at least as precise as a photomicrometer and saves time. (M22)

40-M. A Photomicrometer for X-Ray Diffraction Measurements. *Technical News Bulletin* (National Bureau of Standards), v. 34, Jan. 1950, p. 3-4.

Condensed from "Instrument for Measurement of X-Ray Diffraction Patterns", John A. Bennett, *Review of Scientific Instruments*. See item 39-M, 1950. (M22)

41-M. The Detection of Overheating and Burning in Steel by Microscopical Methods. A. Preece and J. Nutting. *Journal of the Iron and Steel Institute*, v. 164, Jan. 1950, p. 46-50.

Etching reagents which have been used to detect overheating and burning in steel. Action of an electrolytic ammonium nitrate etch, and a theory advanced for its differential action. 11 ref. (M21, ST)

42-M. Microradiography and Metals. W. Betteridge. *Metal Industry*, v. 76, Jan. 6, 1950, p. 5-8.

Techniques; diagrams and microradiographs of steels and cast iron. The method is said to be particularly applicable to steels. (M23, ST, CI)

43-M. Metallurgical Applications of the Electron Microscope; Report on Recent Symposium. G. A. Geach. *Metallurgia*, v. 41, Dec. 1949, p. 115-120.

Reviews 14 papers presented at symposium by the Institute of Metals in Nov. 1949. (M21)

44-M. Crystal Structure of Pt_2Sn_3. (In German.) Konrad Schubert and Hermann Pfisterer. *Zeitschrift für Metallkunde*, v. 40, Nov. 1949, p. 405-411.

X-ray investigation to determine atomic dimensions of the above compound as well as of various phases of the Pt-Sn system. Effect of heat treatment. (M26, N9, Pt, Sn)

45-M. Investigation of Structures of Metallic Films Obtained on the Surface of Aqueous Solutions of Salts and Metals by the Action of Gaseous Reducing Agents. I. Structure of Platinum Films. (In Russian.) N. N. Buinov, N. V. Demenev, A. S. Shur, and G. G. Fedorova. *Kolloidnyi Zhurnal* (Colloid Journal), v. 11, Sept.-Oct. 1949, p. 289-298.

Experimental investigation revealed that the structure of Pt films changes with their thickness, i.e., with time of reduction. Films consisting of individual elementary crystals are obtained with increased reduction time. 11 ref. (M26, Pt)

46-M. The Alloy Systems Uranium-Aluminum and Uranium-Iron. Paul Gordon and A. R. Kaufman. *U. S. Atomic Energy Commission*, AECD 2683, Aug. 26, 1949, 31 pages.

Previously abstracted from *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers.* See item 14-M, 1950. (M24, U)

47-M. The Iron-Nitrogen System. V. G. Paranjpe, Morris Cohen, M. B. Bever, and C. F. Floe. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Feb. 1950, p. 261-267.

Investigated by X-ray diffraction measurements and a controlled nitrogenizing method. The latter depends on the relation between the nitrogenizing power of an NH_3-H_2 mixture and the N_2 content of the Fe-N alloy produced. Several heretofore controversial features of the Fe-N phase diagram are clarified. 17 ref. (M24, Fe, N)

48-M. A Study of the Iron-Chromium-Nickel Ternary System. J. W. Pugh and J. D. Nisbet. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Feb. 1950, p. 268-276.

Fe-Cr-Ni phase relationships in 55 alloys were studied by means of hardness, elongation, tensile strength, dilatometer indications, and microstructure analysis. 15 ref. (M24, Fe, Cr, Ni)

49-M. Special Mounting Techniques. Earl C. Roberts. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Feb. 1950, p. 353.

Two simple techniques. The first proved very satisfactory for the study of untempered martensite. The second was required for the study of slag specimens by reflected light. (M21)

50-M. Microstructure of Iron-Silicon Alloys As Developed by the Powder Metallurgy Process. R. Wachtell. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Feb. 1950, p. 354-360.

A succession of micrographs shows portion of the diffusion process occurring in Fe-Si powder compacts. Metallographic characteristics of Fe-Si alloys (especially in the 6% Si range), compounded by the powder process; various misleading pseudomorphic structures encountered. An etch which indicates Si content within rather wide ranges. 17 ref. (M27, H general, Fe)

51-M. Measurement of Relative Interface Energies in Twin Related Crystals. C. G. Dunn, F. W. Daniels, and M. J. Bolton. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Feb. 1950, p. 368-377.

The nature of boundaries in twin related grains of Si iron was investigated and the relative interface energy of the (112) twin was determined. Effect of boundary orientation on boundary energy. Mathematical and experimental techniques. 11 ref. (M27, Fe)

52-M. Electrolytic Polishing of Copper. *Iron Age,* v. 165, Feb. 2, 1950, p. 89. Condensed from "Electrolytic Polishing and Short-Circuit Etching of Copper and Cuprous Alloys", M. Jaroszewicz-Bortnowski and J. Schoofs.

Previously abstracted from *Engineers' Digest.* See item 11-389, 1949. (M21, Cu)

53-M. Fractographic Studies of Ingot Iron. *Iron Age,* v. 165, Feb. 2, 1950, p. 95. Based on "Fractographic Study of Deformation and Cleavage in Ingot Iron", C. A. Zapffe and C. O. Worden.

Previously abstracted from *American Society for Metals,* Preprint No. 31, 1949. See item 4B-95, 1949. (M23, Q24, Fe)

54-M. The Structure of Cerium at the Temperature of Liquid Air. A. F. Schuch and J. H. Sturdivant. *Journal of Chemical Physics,* v. 18, Jan. 1950, p. 145.

The data show the presence in quenched cerium at 90° K. of two phases. One is the normally contracted room-temperature form. The other is an anomalously contracted phase which is also face-centered cubic. Its cell edge of 4.82Å represents a 16.5% decrease in volume below that of the parent structure. (M26, Ce)

55-M. X-Ray Measurement of Order in Single Crystals of Cu_3Au. J. M. Cowley. *Journal of Applied Physics,* v. 21, Jan. 1950, p. 24-30.

X-ray diffraction methods were used to measure long and short-range order parameters at elevated temperatures. Short-range parameters are given for the first ten shells of atoms surrounding a given atom for three temperatures above the critical temperature of Cu_3Au. These results, and those for long-range order parameter agree well with theoretical predictions. 13 ref. (M26, Cu, Au)

56-M. The Identification of Solid Corrosion Products. C. M. Schwartz. *Corrosion,* v. 6, Feb. 1950, p. xi.

Program of NACE Technical Practices Committee TP-11, on Identification of Corrosion Products. (M27, R general)

57-M. Optical Metallography of Titanium. Walter L. Finlay, John Resketo, and Milton B. Vordahl. *Industrial and Engineering Chemistry,* v. 42, Feb. 1950, p. 218-222.

Special characteristics of Ti which are of controlling importance in its optical metallography. Metallographic techniques and typical microstructures of commercially pure unalloyed Ti in a variety of metallurgical conditions. Structures of Ti-base alloys. (M21, Ti)

58-M. Recording Dilatometer for Measuring Thermal Expansion of Solids. John C. Turnbull. *Journal of the American Ceramic Society,* v. 33, Feb. 1, 1950, p. 54-56.

Instrument in which a resistance strain gage is used to measure linear thermal expansion. The recording feature is obtained with a conventional recording potentiometer that prints strain-gage output directly, together with sample temperature. 11 ref. (M23)

59-M. X-Rays and Microscopical Metallography. A. J. Bradley. *Metal Industry,* v. 76, Jan. 20, 1950, p. 49-53.

Investigation of the Fe-Ni-Al system, an equilibrium diagram being constructed for the 750-1350° C. region. Results indicate that the X-ray method is most useful for rapid preliminary survey of an unknown equilibrium diagram. However, accurate and careful delineation of phase boundaries at a series of temperatures is most easily carried out by means of the optical microscope. (M22)

60-M. The Constitution of the Silver-Rich Silver-Magnesium-Zinc Alloys. G. V. Raynor and R. A. Smith. *Journal of the Institute of Metals,* v. 76. Dec. 1949, p. 389-406.

Examined by micrographic methods, with confirmatory X-ray experiments. Isothermals were established at 650, 450, and 250° C. Form of the β-γ equilibria in relation to atomic size effects and electron-atom ratios. 12 ref. (M24, Ag)

61-M. Sub-Crystals in Aluminium Observed With Polarized Light. D. McLean, A. E. L. Tate, and M. H. Farmer. *Nature,* v. 165, Jan. 14, 1950, p. 70.

Evidence for breakdown of the original crystals into sub-crystals under certain conditions of deformation. (M26, Al)

62-M. Measurement of the Parameters of Cubic Polycrystals on the Basis of Debye-Scherrer Diagrams. (In French.) *Comptes Rendus* (France), v. 229, Dec. 5, 1949, p. 1242-1244.

Proposes a new graphic method characterized by simplicity and accuracy. Use of a standard sample is unnecessary. Typical measurements on aluminum (99.998% pure) illustrate the procedure. (M22, Al)

63-M. Inclusions and Grain-Boundary Materials in Steel. (In German.) Rudolf Schäfer. *Archiv für das Eisenhüttenwesen,* v. 20, Nov.-Dec. 1949, p. 349-353.

How oxide inclusions in the form of suspensions and grain-boundary materials can be made visible under the microscope by use of a weak (0.15-0.20%) alcoholic iodine solution. This metallographic method permits study of the effect of various factors on formation of inclusions. The advantages of deoxidizing with Al, of shallow baths, and of refining in electric furnaces.
(M21, D general, ST)

64-M. The Crystal Structure of $Mg_2Cu_6Al_5$. (In German.) Sten Samson. *Acta Chemica Scandinavica,* v. 3, no. 8, 1949, p. 809-834.

Detailed structural analysis of a phase which has been assigned the composition $Mg_3Cu_7Al_{10}$, was performed with the aid of a Patterson projection and X-ray powder diffraction. The elementary cell is shown to consist of three units of $Mg_2Cu_6Al_5$. (M26,Cu)

65-M. The Crystal Structure of Mg_2Zn_{11}; Isomorphism Between Mg_2Zn_{11} and $Mg_2Cu_6Al_5$. (In German.) Sten Samson. *Acta Chemica Scandinavica,* v. 3, no. 8, 1949, p. 835-843.

It was determined by complete structural analysis that the above two phases are isomorphous. Includes detailed powder-photograph data. (M26, Zn, Cu)

66-M. X-Ray Camera for Photographing Inverse Lattices. (In Russian.) Yu. A. Bagaryatskii and M. M. Umanskii. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Nov. 1949, p. 1320-1328.

Newly developed X-ray diffraction camera for investigation of crystal structure. (M22)

67-M. Method of X-Ray Investigation of Structural Changes During Aging of Coarse-Grained Polycrystalline Alloys. (In Russian.) A. M. Elistratov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 69, Nov. 21, 1949, p. 337-340.

Method of interpretation of X-ray diffraction patterns for the above alloys. Schematic drawings explain the technique of calculation of crystallographic constants. (M22)

68-M. Metallographic Technique for Steel; Action of Miscellaneous Etchants. *Metal Progress,* v. 57, Feb. 1950, p. 212-B.

Last of six data sheets shows martensite, tempered martensite, bainite, pearlite colonies, and depth of etching vs. magnification. (M21, ST)

69-M. Short Circuit Etching of Copper. *Iron Age,* v. 165, Feb. 16, 1950, p. 99.

Based on article by M. Jaroszewicz-Bortnowski and J. Schoofs. **Engineers Digest.** See item 11-389, 1949. (M21, Cu)

70-M. MnSi and FeSi Determinations in Manganese Bronze. David M. Zall. *American Foundryman,* v. 17, Feb. 1950, p. 61-62.

Selective-solubility method for isolating inclusions in manganese bronze. X-ray diffraction patterns reveal the presence of FeSi and MnSi. (M22, Cu)

71-M. A Three-Stage Electron Microscope With Stereographic Dark Field, and Electron Diffraction Capabilities. M. E. Haine, R. S. Page, and R. G. Garfitt. *Journal of Applied Physics,* v. 21, Feb. 1950, p. 173-182.

Microscope in which magnifications between 1000 and 100,000 can be covered continuously. The instrument can be used to obtain electron-diffraction patterns characteristic of small areas of a specimen under microscopic observation. Some typical micrographs. (M21)

72-M. Comments on the Use of Latex Spheres as Size Standards in Electron Microscopy. Charles H. Gerould. *Journal of Applied Physics,* v. 21, Feb. 1950, p. 183-184.

Latex spheres have been distributed to about 225 laboratories in the U. S. and abroad. Seventeen of them have made average-particle-size determinations, using six different techniques. Results are tabulated and correlated. Effects of various factors on size and precautions in handling and storage. (M21)

73-M. Optical Micrography. (Concluded.) Jean Ternisien. *Microtecnic* (English Edition), v. 3, Nov.-Dec. 1949, p. 280-288. Translated from the French.

Metallurgical applications of the compound microscope; the polarized-light microscope and its applications; photomicrography; and motion-picture photomicrography. 25 ref. (M21)

74-M. The Atomic Arrangement of Amorphous Germanium. (In German.) Otto Fürst, Richard Glocker, and Hans Richter. *Zeitschrift für Naturforschung,* v. 4a, Oct. 1949, p. 540-542.

X-ray Fourier analysis reveals that the atoms of vapor-deposited amorphous Ge are differently arranged than in molten Ge. Diagram explains the relationship between the two arrangements. 15 ref. (M26, Ge)

75-M. A Graphic Method for Computing Structural Factors for X-Ray Analysis of Crystals. (In German.) Walter Hoppe and L. Camerer. *Zeitschrift für Naturforschung,* v. 4a, Nov. 1949, p. 637-639.

Description clarified by diagrams. (M26, M22)

76-M. The Vanadium-Nitrogen System. Metal Amides and Metal Nitrides. (In German.) Harry Hahn. *Zeitschrift für anorganische Chemie,* v. 258, Feb. 1949, p. 58-68.

Preparation, methods of analysis and properties. The nitrides have distinct physical properties and the thermal resistance of VN is extraordinarily high; N is not soluble in V. 20 ref. (M24, V, N)

77-M. Status of Carbides in Annealed Steel. (In Russian.) M. P. Arbuzov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 19, Oct. 1949, p. 1119-1125.

Carbide powders separated from steel annealed at temperatures of 400-680° C. were studied by X-ray diffraction. It was concluded that carbide formed at 400° C. has a rhombic lattice with constants similar to those of the cementite lattice of annealed steel. (M26, ST)

78-M. (Book) **Materials Testing With X-Rays. Ed. 3.** (In German.) Richard Glocker. 440 pages. 1949. Springer-Verlag, Berlin, Göttingen, or Heidelberg, Germany.

While the new edition follows the same general plan as earlier ones, a new section has been added on noncrystalline materials and liquids. Also includes new equipment developed in recent years. The section on X-ray measurement of stresses in metals has been considerably expanded. An important section is a classification and description of the types of crystal structure. (M22)

79-M. X-Ray Diffraction Patterns Measured by "Photomicrometer". *Steel,* v. 126, Feb. 27, 1950, p. 64-65.

See abstract from *Review of Scientific Instruments,* item 39-M, 1950. (M22)

80-M. Fundamentals of the Working of Metals. Part VIII. Ingot Structure and Working. George Sachs. *Modern Industrial Press,* v. 12, Feb. 1950, p. 6, 8, 44.

Grain structures, segregations, and inclusions, as cast and after working, are diagrammed and discussed. (M27, Q24)

81-M. The Structure of Atoms From Diffraction Studies. H. Hauptman and J. Karle. *Physical Review,* ser. 2, v. 77, Feb. 15, 1950, p. 491-499.

Method for obtaining electron distribution in atoms from diffraction data. 15 ref. (M25, M22)

82-M. The Alloy Systems Uranium-Tungsten, Uranium-Tantalum and Tungsten-Tantalum. C. H. Schramm, P. Gordon, and A. R. Kaufmann. *U.S. Atomic Energy Commission,* AECD-2686, Aug. 26, 1949, 30 pages.

Previously abstracted from *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers.* See item 15-M, 1950. (M24, U, Ta, W)

83-M. The Crystal Structure of UBi. Leo Brewer, Russell K. Edwards, and David H. Templeton. *U.S. Atomic Energy Commission,* AECD-2730, Aug. 31, 1949, 7 pages.

Preparation of suitable samples for X-ray investigation. Shows that UBi has a NaCl structure. (M26, U, Bi)

84-M. Metallography in Color. R. P. Loveland. "Symposium on Metallography in Color," *American Society for Testing Materials,* Special Technical Publication No. 86, June 21, 1949, p. 2-22.

Processes for making photographs. Integral tripack processes, illumination, color-compensation filters, exposure, and application to metallography. 11 ref. (M21)

85-M. Microscope Optics for Color Metallography. James R. Benford. "Symposium on Metallography in Color", *American Society for Testing Materials,* Special Technical Publication No. 86, June 21, 1949, p. 23-27; discussion, p. 28-29.

Experimental means used to evaluate optical designs, and the influence of color work on the design program. (M21)

86-M. Quality and Quantity of Illumination in Color Metallography. R. P. Loveland. "Symposium on Metallography in Color", *American Society for Testing Materials,* Special Technical Publication No. 86, June 21, 1949, p. 30-47; discussion, p. 48-50.

Utilization of color metallography and advantages in photomicrography, quantitative analysis criteria, exposure, and quality of illumination. Appendixes describe use of hand exposure meter and calibration of the amplification-type electronic photometer. (M21)

87-M. Color Metallography Simplified. Mason Clogg, Jr. "Symposium on Metallography in Color", *American Society for Testing Materials,* Special Technical Publication No. 86, June 21, 1949, p. 51-53.

Method of making color photomicrographs with the aid of a light-correction meter and a special set of light correction disks. (M21)

88-M. Some Applications of Color Metallography. W. D. Forgeng. "Symposium on Metallography in Color", *American Society for Testing Materials,* Special Technical Publication No. 86, June 21, 1949, p. 54-58.

General discussion followed by discussion of carbide constituents in tool metals; the σ-phase, Fe-Cr in Fe-Cr and Fe-Cr-Ni alloys; and color micrography with polarized light. (M21)

89-M. Progress in the Theory of Alloys. G. V. Raynor. "Progress in Metal Physics" (Interscience Publishers, New York), v. 1, 1949, p. 1-76.

Primary solid solutions, electron compounds, the electronic theory, intermediate phases, behavior of transition metals in Al alloys, and lattice spacings. 113 ref. (M26)

90-M. Theory of Dislocations. A. H. Cottrell. "Progress in Metal Physics" (Interscience Publishers, New York), v. 1, 1949, p. 77-126.

Mechanics of the atomic movements involved in plastic deformation. Types, properties, interaction, assemblies, and origin of dislocations. Structural strain hardening, aging and annealing worked metals, flexible dislocations, and precipitation hardening. 76 ref. (M26, Q24, N7)

91-M. Crystal Boundaries. R. King and Bruce Chalmers. "Progress in Metal Physics" (Interscience Publishers, New York), v. 1, 1949, p. 127-162.

Reviews recent experimental and theoretical work. Origin, mechanical properties, chemical behavior, and effects of boundaries. 53 ref. (M26)

92-M. Taper Sectioning; A Method for the Examination of Metal Surfaces. E. Rabinowicz. *Metal Industry,* v. 76, Feb. 3, 1950, p. 83-86. (M21)

93-M. Metallographic Studies on Complex Light Alloys. I. (In Japanese.) Takuiti Morinaga, *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, July 1949, p. 11-15.

Results of determination of aging behavior, corrosion resistance, grain size, and effect of heat treatment on structure indicate that the τ-phase is formed during coexistence of Mn and Si. (M27, Al)

94-M. The Application of Color Photography to the Study of Nonmetallic Inclusions. A. M. Hall and E. E. Fletcher. "Symposium on Metallography in Color", *American Society for Testing Materials,* Special Technical Publication No. 86, June 21, 1949, p. 59-63; discussion, p. 64.

13 references. (M21)

95-M. The Uranium-Manganese and Uranium-Copper Alloy Systems. H. A. Wilhelm and O. N. Carlson. *U. S. Atomic Energy Commission,* AECD-2717, Aug. 15, 1949, 17 pages.

Investigated by thermal, microscopic, and X-ray methods. Compounds identified. (M24, U, Mn, Cu)

96-M. The Study of Alloy Systems; Chemical Extraction Method for Constitutional Investigations. *Metal Industry,* v. 76, Feb. 10, 1950, p. 103-105.

Details of technique. A slowly cooled ingot is prepared, sectioned, and examined micrographically. If this examination reveals the intermediate phases present to be free from rims or inclusions, another portion is made the anode in an electrolytic cell, with a nickel strip as cathode. The residue obtained is washed and dried, examined under a low-power binocular microscope, and perfect crystals isolated. Illustrated by phases from the Al-Mn-Zn (9-90% Zn; 0-5% Mn) and Al-Fe-Si systems. (M23, Al, Zn)

97-M. Metallic Segregation in Ferritic Steels; An Application of Microradiography. K. J. B. Wolfe and I. R. Robinson. *Metal Treatment and Drop Forging,* v. 16, Winter 1949-50, p. 209-218.

Fundamentals of microradiography, including use of both "white" and characteristic radiation, and details of suitable apparatus and techniques. The absorption edge method is used to demonstrate the presence of segregations of Mn, Cr, and W. The quantity of Mn segregations present is reduced by a small Mo content in the steel. 14 ref. (M23, AY)

98-M. Electron Microscopy in Metallurgy; Techniques and Applications to Study of Metals. *Metal Treatment and Drop Forging,* v. 16, Winter 1949-50, p. 247-251.

Reviews proceedings of recent London symposium sponsored by the Institute of Metals and other societies. (M21)

99-M. The Manganese-Germanium System. (In German.) Ulrich Zwicker, Eduard Jahn, and Konrad Schubert. *Zeitschrift für Metallkunde,* v. 40, Dec. 1949, p. 433-436.

Experiments made to determine the Mn-Ge constitution diagram, to study the metallographic and X-ray structures of the alloys in this system, and to determine their magnetic and other physical properties. (M24, P general, Mn, Ge)

100-M. The Ternary Indium-Tin-Cadmium System. (In German.) Erich Gebhardt. *Zeitschrift für Metallkunde,* v. 40, Dec. 1949, p. 437-440.

Method of experimentation and brief review of work done on the In-Sn, Sn-Cd, and Cd-In systems. The eutectic of the In-Sn-Cd system was established at 93° C. and its composition was found to be 44% In, 42% Sn, and 14% Cd. Constitution diagrams and cooling curves. (M24, In, Sn, Cd)

101-M. Research on the Structure of Metals With the Aid of "Electrolytic Spot Etching". Development of a Practical Instrument for Continuous Structure Control as a Substitute for the Time-Consuming Preparation of Polished Samples. (In German.) G. Stähli and W. Rüegg. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 16, Jan. 1950, p. 25-27.

Proposed equipment makes it possible to prepare a sample for metallographic examination in 20-30 sec. (M21)

102-M. The Binary Systems of Titanium With the Elements Nitrogen, Carbon, Boron, and Beryllium. (In German.) Paul Ehrlich. *Zeitschrift für anorganische Chemie,* v. 259, July 1949, p. 1-41.

The nitrides, carbides, borides, and Be alloys of Ti were prepared by powder metallurgy under high vacuum, and the products were studied by X-ray and pyknometric methods. Results show great similarity of the four systems. 71 ref. (M24, Ti)

103-M. Metal Amides and Metal Nitrides. Report 20. The Iron-Nickel-Nitrogen System. (In German.) Harry Hahn and Heinz Mühlberg. *Zeitschrift für anorganische Chemie,* v. 259, July 1949, p. 121-134.

Fe-Ni alloys ranging in iron content from 10 to 95 atomic % Fe were "nitrided" in a stream of NH_3 at 300-1000° C. Results show that N_2 absorption of the alloys increases linearly with Fe content. However, the maximum N_2 absorption can be increased by heat treating and quenching from 600-800° C. before nitriding at 400-500° C. Various phases of the resulting alloys were studied by X-ray diffraction. 17 ref. (M27, Fe, Ni)

104-M. The Crystal Structures of Ga_2S_3, Ga_2Se_3, and Ga_2Te_3. (In German.) Harry Hahn and Wilhelm Klingler. *Zeitschrift für anorganische*

Chemie, v. 259, July 1949, p. 135-142.

Determined from Debye-Scherrer patterns. Surveys compounds having the structure of wurtzite or zinc blende. (M26, Ga, Se, Te)

105-M. Metal Amides and Metal Nitrides. Report 21. Solid Solutions of the Composition $(Li,Co)_3N$, $(Li,Ni)_3N$, and $(Li,Cu)_3N$. (In German.) Werner Sachsze and Robert Juza. *Zeitschrift für anorganische Chemie,* v. 259, Sept. 1949, p. 278-290.

The nitrogen absorption of Co, Ni, and Cu when heated with lithium nitride at 600, 560, and 620° C., respectively, was determined. X-ray studies indicate that the resulting products are solid solutions. 12 ref. (M27, Li, Ni, Co, Cu)

106-M. Determining Irregular Lattice Distortions. (In German.) R. Fricke and A. Seitz. *Zeitschrift für anorganische Chemie,* v. 259, Sept. 1949, p. 303-304.

A new method for the above, using a counting tube for measuring the intensities. Several examples are presented. (M26)

107-M. Investigation of the Constitution Diagram of the System Al-Cu-Mg-Si. (In Russian.) D. A. Petrov and N. D. Nagorskaya. *Zhurnal Obshchei Khimii* (Journal of General Chemistry), v. 19(81), Nov. 1949, p. 1994-2037.

On the basis of data obtained by physico-chemical analysis of nine linear cross sections of the above system, a tetrahedral diagram was prepared. 13 ref. (M24, Al, Cu, Mg, Si)

108-M. Determination of the Depth of Penetration of the Martensite Zone in Tempered Steel by a Magnetic Method. (In Russian.) M. V. Dekhtyar. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 19, Dec. 1949, p. 1397-1407.

Experimental verification of a method for calculation of the coercive force of a heterogeneous two-layered cylinder, based on the assumption that the coercive force of such a ferromagnetic body is not entirely characterized by the material, but is dependent on the relationship between the cross section of the core and the shell. Based on this principle, a method is developed for the above. 20 ref. (M23, N8, ST)

109-M. The Constitution of Alloys. R. L. Cunningham. *Canadian Metals,* v. 13, Feb. 1950, p. 10-13, 49.

What phase diagrams are and how they can be applied in the metal industry. (M24)

110-M. Welding Metallurgy—Iron and Steel. Chapter 7. Effects of Alloying Elements. O. H. Henry, G. E. Claussen, and G. E. Linnert. *Welding Journal,* v. 29, Mar. 1950, p. 216-226. Reprinted from second edition of book.

Solubility, equilibrium diagrams, effects on mechanical and physical properties in general, and effects of specific alloying elements in iron, aluminum, and copper. (M24, Q general, Fe, Al, Cu)

111-M. Thorium-Carbon System. H. A. Wilhelm and P. Chiotti. *U. S. Atomic Energy Commission,* AECD-2718, Sept. 30, 1949, 14 pages.

Constitution diagram constructed from metallographic, X-ray, and melting data. 12 ref. (M24, Th)

112-M. The Crystal Structures of CeB_6, ThB_6, and UB_6. Allan Zalkin and D. H. Templeton. *U. S. Atomic Energy Commission,* AECD-2762, Nov. 22, 1949, 2 pages.

(M26, Ce, Th, U)

113-M. Constitution Diagram and Phase Transformations in the Iron-Nitrogen System. (In Russian.) I. E. Kontorovich and A. A. Sovalova. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Nov. 1949, p. 1675-1684.

Investigated with emphasis on phase transformations at nitrogen concentrations above 2.5-3.0% at temperatures above the eutectoid (591° C.). Data indicate that, of two constitution diagrams currently in use, the diagram with a peritectoid transformation is erroneous. Methods of investigation by X-ray diffraction and metallographic study. Microhardness of different structural components of nitrided layers was determined. (M24, N8, Fe)

114-M. (Book) **Symposium on Metallography in Color.** 64 pages. 1948. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Special Technical Publication No. 86. Cloth bound, $5.15; paper bound, $4.50.

Papers (abstracted separately) on microscope optics, quality and quantity of illumination, and applications. Includes 8 pages of color insert plates. 33 ref. (M21)

115-M. (Book) **Introduction to Crystallography.** (In German.) H. Schneiderhohn. 464 pages. Verlag Karl Alber, Freiburg in Breisgau, Germany. 40 marks.

History of crystallography, its geometric, chemical, and physical aspects. (M26)

116-M. (Book) **Metallography of Magnesium and Its Technical Alloys. Ed. 2.** (In German.) W. Bulian and E.

Fahrenhorst. 100 pages. 1949. Springer-Verlag, Berlin, Germany.

One of a series of monographs on pure and applied metallography. 250 illustrations, including many photomicrographs. Sections dealing with alloys are limited almost entirely to the Mg-Mn and Mg-Al-Zn groups. (M21, M27, Mg)

117-M. Atomic Diameters of Metallic Elements. Pol Duwez. *Metal Progress,* v. 57, Mar. 1950, p. 348, 348B.

Development of accurate values Values are represented graphically. (M25)

118-M. Radial Structure of Graphite Nodules. M. Hatherly and L. E. Samuels. *Metal Progress,* v. 57, Mar. 1950, p. 337.

Illustrations show that this structure is strongly apparent only when using polarized light and a prism illuminator. (M21, CI)

119-M. Uranium as a Metallographic Aid. E. H. Rowe. *Metal Progress,* v. 57, Mar. 1950, p. 336.

By spraying the sample or replica in vacuum with a stream of heavy-metal atoms, directed from an oblique angle, the particles or irregularities on the object's surface become coated on one side with the thinnest film of metal, while the areas on the opposite side receive no coating. Hence deep shadows appear on the final photograph. Uranium was found superior to chromium. (M21, U)

120-M. Electron Metallography of Cemented Carbides. William L. Grube. *Metal Progress,* v. 57, Mar. 1950, p. 341-345.

Conventional metallography and details of electron-metallographic techniques. Typical results for tungsten carbide-cobalt compositions. (M21, W, Co, C)

121-M. Room-Temperature Mounting of Metallurgical Specimens. *Technical News Bulletin,* National Bureau of Standards, v. 34, Mar. 1950, p. 31-32.

Simple, inexpensive method for mounting metallurgical specimens at temperatures only slightly above room temperature and without external application of heat. The technique employs a modified acrylic denture material which will polymerize or set under pressure at room temperature. (M21)

122-M. Micro-Radiography Applied to the Study of Iron Ores and Sinters. E. Cohen. *Metallurgia,* v. 41, Feb. 1950, p. 227-233.

Technique for studying distribution of Fe in low-grade British iron ores and sinters. Sample preparation and mounting, nature of ores and sinters, and radiography. (M23, Fe)

123-M. Optical Methods of Determining Grain Orientation in Electrical Sheet Steel. *Metallurgia,* v. 41, Feb. 1950, p. 240.

Two optical methods developed in the B. T. H. Research Laboratory (Britain). (M27, ST)

124-M. On the Interactions of Dislocations and Solute Atoms. B. A. Bilby. *Proceedings of the Physical Society,* v. 63, sec. A, Mar. 1, 1950, p. 191-200.

An extension of the reciprocal theorem of Colonetti is given and with it a general expression derived for the elastic energy of a multiply-connected solid containing sources of internal stress and subjected to external forces. The expression is used to estimate approximately the interaction energy between parallel edge dislocations with arbitrary slip vectors, between parallel screw dislocations, and between an edge dislocation and a solute atom causing a spherical distortion of the lattice. (M26)

125-M. Epitaxial Strain and Disorientation in Crystals Growing on Single-Crystal Substrates. D. M. Evans and H. Wilman. *Proceedings of the Physical Society,* v. 63, sec. A, Mar. 1, 1950, p. 298-299.

Electron-diffraction patterns obtained from a zinc-blende (110) cleavage face after heating in air, constitute the first clear example of rotational slip caused by epitaxial stresses. Extensive rotational slip in a Cu crystal was also demonstrated. (M26)

126-M. The Thermal Etching of Single Crystals of Cadmium. E. N. da C. Andrade and R. F. Y. Randall. *Proceedings of the Physical Society,* v. 63, sec. B, Mar. 1, 1950, p. 198-208.

Heating of single crystal wires of Cd with free evaporation causes formation of crystalline planes. When the basal plane makes a small angle with the axis of the wire there is a characteristic formation of hexagonal pits, the bottoms of which are mirror-like basal planes; when the basal planes make larger angles, characteristic elliptical traces appear, similar to those formed by mechanical extension. Thermal etching reveals thin laminae in the unstrained wire; the thickness of which is the same as the spacing of the glide planes revealed by mechanical extension. The etched figures, in general, indicate that the substructure revealed by straining is

already present in the unstrained crystal. 17 ref. (M27, M26, Cd)

127-M. Microstructure Recordings in Ultra-Short Times Using an X-Ray Flash-Discharge Tube. (In German.) Rudi Schall. *Zeitschrift für angewandte Physik,* v. 2, Feb. 1950, p. 83-88.

Process makes it possible to record microstructural diagrams of monocrystals with exposures of less than ½ μsec. Illustrates the process by investigating the lattice deformation caused by the explosive vaporization of an Al foil supported on a mica plate. (M23, M26)

128-M. Temperature-Composition Diagrams of Metal-Metal Halide Systems. E. D. Eastman, D. C. Cubicciotti, and C. D. Thurmond. "Chemistry and Metallurgy of Miscellaneous Materials —Thermodynamics", Ed. 1, 1950, p. 6-12.

Systems Ba-$BaCl_2$, Ba-$BaBr_2$, Sr-$SrBr_2$, Sr-SrI_2, Ce-$CeCl_3$, Ca-$CaCl_2$ were studied by thermal analysis. In all the systems two components are mutually soluble to a limited extent with a region of immiscibility between. Systems give evidence that no "fog" formation takes place, but that all the metal dissolves in the solution.
(M24, Ba, Sr, Ce, Ca, EG-f)

129-M. An Easy Way To Measure Copper Grain Size. E. W. Schoen. *Iron Age,* v. 165, Apr. 6, 1950, p. 102-103.

How grain size of Cu and Cu alloys may be positively determined with a standard Bausch & Lomb grain-size determination eye-piece such as that ordinarily used for steel. (M27, Cu)

130-M. Specimens Can Be Mounted at Room Temperature. *Iron Age,* v. 165, Apr. 6, 1950, p. 106.

Technique, developed by D. L. Smith, National Bureau of Standards, which employs a denture material of modified acrylic resin as the mounting. The material consists of a polymer and monomer which, when mixed in the proper proportions, will polymerize or set under pressure at room temperature. (M21)

131-M. The Crystal Structures of CeB_4, ThB_4, and UB_4. Allan Zalkin and D. H. Templeton. *Journal of Chemical Physics,* v. 18, Mar. 1950, p. 391.

Previously abstracted from *U. S. Atomic Energy Commission,* AECD-2762. See item 112-M, 1950.
(M26, Ce, Th, U)

132-M. Static Models of Dislocations. B. A. Bilby. *Journal of the Institute of Metals,* v. 76, Feb. 1950, p. 613-627.

Describes and illustrates a model with which various crystal lattices can be built. These can be deformed elastically and dislocations introduced. With this model, geometry of the motion and arrangement of dislocations of various types, and certain results of the elastic theory of dislocations, can be demonstrated. Examples of dislocations in a simple cubic lattice. 18 ref. (M26)

133-M. Note on the Use of Electropolishing in the Metallographic Study of Plastic Deformation. G. R. Wilms. *Journal of the Institute of Metals,* v. 76, Feb. 1950, p. 629-630.

Attention is drawn to some misleading observations that may be made if anodic films are not removed from the electropolished specimens. (M21, Q24)

134-M. The Structure of Eutectics. E. C. Ellwood and K. Q. Bagley. *Journal of the Institute of Metals,* v. 76, Feb. 1950, p. 631-642.

Crystal structures of four binary alloys, Ag-Cu, Al-Cu, Ag-Al, and Fe-cementite, each of which consists at room temperature of a two-phase system in which the phases were formed simultaneously at a higher temperature, were studied. It was found that a single crystal of eutectic acts, with logical exceptions, as a combination of two interlacing single crystals—one from each phase—and that the phases are aligned in such a manner as to cause least interference at the crystal interface. Possible effect of crystal structure and similarity of atomic spacing on solid solubility. 11 ref.
(M26, Ag, Al, Cu, Fe)

135-M. Electrolytic Polishing of Titanium. D. A. Sutcliffe, J. I. M. Forsyth, and J. A. Reynolds. *Metallurgia,* v. 41, Mar. 1950, p. 283-284.

Titanium may be satisfactorily electropolished by making it the anode of a cell containing a mixture of acetic and perchloric acids, using a Ti-plate cathode and a current density of 30-40 amp. per sq. dm. A feature of the method is the short time required to obtain a scratch-free surface. (M21, L13, Ti)

136-M. The Specific Energy of Crystal Boundaries in Tin. K. T. Aust and B. Chalmers. *Proceedings of the Royal Society,* ser. A, v. 201, Mar. 22, 1950, p. 210-215.

Three tin crystals of predetermined orientations were prepared with various differences of orientation between two of the crystals. Equilibrium angles between the three boundaries were measured. Relative values of specific surface free energy

were deduced from the angles, and it was found that surface energy decreases progressively as the difference of orientation decreases below about 6°. The result is believed to provide strong support for the "transitional lattice" theory. (M26, Sn)

137-M. Micrographic Study of Solidification Structures of 99.5% Pure Aluminum. (Heterogeneous Structure.) (In French.) J. Hérenguel. *Revue de Métallurgie,* v. 47, Jan. 1950, p. 29-38; discussion, p. 38.

Results of experimental investigation, including numerous micrographs. Study of causes of localization of attack as shown by corrosion or etching patterns. Effects of added metals more electropositive than Al (Cu, Si, Fe) and more electronegative (Mg) on the latter. Relationship between localized attack and other micrographic observations. (M27, R1, Al)

138-M. Thermal Polishing and Etching of Nickel. Glen W. Wensch. *Metal Progress,* v. 57, Apr. 1950, p. 488.

During some experiments it was noted that the surfaces of nickel specimens became polished and etched during a long anneal when sealed in quartz tubes. The polishing and etching is the result of evaporation of metal from the surface of the specimen. The phenomenon may provide a feasible method for obtaining metallographic data concerning high-temperature allotropic phases. (M21, Ni)

139-M. Rapid Production of Small Metal Particles. G. F. Tisinai and R. B. Hendry. *Metal Progress,* v. 57, Apr. 1950, p. 490.

For production of particles used in X-ray powder-diffraction work, a small power hacksaw is converted into a filing machine by replacing the hacksaw blade with a jig for holding the file. (M22)

140-M. The Determination of the Texture of Rolled Sheet From X-Ray Diffraction Photographs. A. E. De Barr and B. Roberts. *Journal of the Iron and Steel Institute,* v. 164, Mar. 1950, p. 285-287.

Method by which full information on the above can be obtained from only 3 or 4 photographs. Illustrated with reference to rolled iron sheet, but may be applied to other materials. Advantages over usual procedure for construction of pole figures. (M22, Fe)

141-M. The Ternary Lead-Lead Sulfide-Tin-Tin Sulfide System. (In German.) Rudolf Vogel and Anton Zastera. *Zeitschrift für Metallkunde,* v. 41, Jan. 1950, p. 14-19.

A redetermination of the PbS-SnS system showed that a PbS-SnS compound does not exist, as was previously supposed. A slightly greater affinity of sulfur for Sn than for Pb is indicated. 7 ref. (M24, Pb, Zn)

142-M. The Manganese-Phosphorus System. (In German.) Josef Berak and Theo Heumann. *Zeitschrift für Metallkunde,* v. 41, Jan. 1950, p. 19-23.

Experiments made to redetermine the Mn-P system revealed the compounds Mn_2P and MnP and two peritectic phases Mn_3P and Mn_3P_2. 15 ref. (M24, Mn, P)

143-M. Microscopic Observation of the Decomposition of Mg_7Zn_3 Crystals. (In German.) Werner Köster. *Zeitschrift für Metallkunde,* v. 41, Feb. 1950, p. 37-39.

Mg_7Zn_3 crystallizes near the melting point of the alloy, but the crystals are stable only within a range of about 10° C.; and they decompose at 330° C. into Mg solid solution and $MgZn_2$. Includes constitution and numerous photomicrographs. (M26, Mg, Zn)

144-M. Several Problems in the Physics and Chemistry of the "Semimetals" and "Metametals". (In German.) W. Klemm. *Angewandte Chemie,* v. 62, Mar. 21, 1950, p. 133-142.

Proposes that the elements be classified into true metals, metametals, semimetals (metalloids) and nonmetals. Physical and chemical characteristics of the semi- and metametals and their behavior towards each other and towards other elements. Includes constitution diagrams of alloys and compounds. (M24, EG-j)

145-M. Crystal Structure of $PtSn_4$. (In German.) Konrad Schubert and Ulrich Rösler. *Zeitschrift für Naturforschung,* v. 5a, Feb. 1950, p. 127.

Results of determination of lattice dimensions and structures. (M26, Pt, Sn)

146-M. Electropolishing; Adaptation to Metallography. (In Dutch.) A. L. De Sy and H. Haemers. *Metalen,* v. 4, Mar. 1950, p. 129-137.

An illustrated review. 20 ref. (M21)

147-M. (Book) Equilibrium Data for Tin Alloys. L. T. Greenfield and J. S. Bowden. 60 pages. Tin Research Institute, Fraser Road, Greenford, Middlesex, England. (U. S. office: 492 W. 6th Ave., Columbus 1, Ohio.) 2s., 6d. (50c)

Replaces an earlier publication by E. S. Hedges and C. E. Homer. The diagrams are presented in a more convenient form, a single diagram

now being given for each system. Interpretation is facilitated by introduction of temperature and composition coordinates, and confusion is avoided by printing the coordinates in color. Additions have been made to the earlier list of binary alloy systems. Supplementary explanatory notes are appended to many of the diagrams and, where available, information on crystal structure is given. A bibliography of publications on ternary Sn alloy systems is included. (M24, Sn)

148-M. Outer Brillouin Zones for the Face Centred Cubic, Body Centred Cubic and Close Packed Hexagonal Structures. R. L. Berry, M. B. Waldron, and G. V. Raynor. *Research,* v. 3, Apr. 1950, p. 195-196.

Investigation for polyvalent metals, titanium in particular. (M26, Ti)

149-M. An X-Ray Micro-Beam Examination of a Plastically Deformed Metal. J. N. Keller, P. B. Hirsch, and J. S. Thorp. *Nature,* v. 165, Apr. 8, 1950, p. 554-556.

Method consists of illuminating such a small volume of material that the continuous ring obtained with the usual techniques splits up into individual diffraction spots. This is done by using fine-bore, lead-glass capillaries and a high-intensity X-ray generator which gives an intensity of 50 times that of an ordinary tube. The method was tested with a specimen of cold-rolled spectroscopically pure Al. (M22, Al)

150-M. The Nature of the Bonds in Metals and Intermetallic Compounds. Linus Pauling. *Proceedings of the XIth International Congress of Pure and Applied Chemistry* (July 1947), v. 1, p. 249-257; discussion, p. 257.

Conception formulated mainly on empirical arguments. Magnetic properties of transition metals, interatomic distances, and structure. (M26, P16)

151-M. X-Ray Studies of the Special Carbides in "Complex" Alloy Steels in the Annealed State. (In German.) Helmut Krainer. *Archiv fur das Eisenhuttenwesen,* v. 21, Jan.-Feb. 1950, p. 33-38.

Carbide phases in steels containing Cr, Mo, Cb, Ta, Ti, V, and/or W in varying proportions were investigated. 18 ref. (M26, AY)

152-M. X-Ray Investigation of Carbides in Tungsten, Molybdenum, and Vanadium Steels. (In German.) Helmut Krainer. *Archiv fur das Eisenhuttenwesen,* v. 21, Jan.-Feb. 1950, p. 39-41.

Results of above studies made it possible to complete the constitution diagrams of the W and Mo steels. $(FeW)_6C$ was found to be the basis for the high heat resistance of tungsten steels. Experiments showed that a 24 hr. anneal is insufficient to effect equilibrium between the carbides and the matrix of the 41 steels investigated. (M26, M24, AY)

153-M. Application of Group Theory to Analyses of the Anisotropy of Crystals. (In Russian.) N. S. Akulov and Ya. I. Fel'dshtein. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Feb. 1, 1950, p. 593-596.

Mathematical technique. (M26)

154-M. Clarification of the Constitution Diagram of the System Fe-Cr-C. (In Russian.) B. G. Livshits and K. V. Popov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Feb. 1, 1950, p. 633-635.

Isothermal cross section of the above diagram was investigated at temperatures below critical point. Data derived from X-ray and chemical analysis of the carbides are tabulated. (M24, Fe, Cr)

155-M. Study of the Properties of Metals and Alloys at High Temperatures in a Vacuum. (In Russian.) N. T. Gustsov, M. G. Lozinskii, I. F. Zudin, W. A. Bogdanov, and M. P. Matveeva. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Jan. 1950, p. 108-125.

Recently developed method of investigating structure and mechanical properties of metals and alloys over wide temperature range in vacuum. (M23, Q general)

156-M. Sulfides in Alloy Steels. (In Russian.) Yu. T. Lukashevich-Duvanova. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Jan. 1950, p. 126-131.

Complex sulfides present in alloy steel have a stronger bond with carbides than they have in carbon steels, and are separated from them only partially or not at all during cooling of the steel. Steels alloyed with Mo, Cr, W, V, Al, and Ti were investigated. (M26, AY)

157-M. Low Temperature X-Ray Diffraction Apparatus. Donald F. Clifton, *Review of Scientific Instruments,* v. 21, Apr. 1950, p. 339-342.

Two types of cameras giving variable temperatures. One, using cold gas blown over for cooling, permits putting the specimen in place

under liquid nitrogen and keeping it at this temperature while it is aligned in the spectrometer. The other has a working range of 77-375° K., and uses liquid nitrogen as a coolant. (M22)

158-M. Dislocation Models of Crystal Grain Boundaries. W. T. Read and W. Shockley. *Physical Review,* ser. 2, v. 78, May 1, 1950, p. 275-289.

Energies and motions of grain boundaries between two crystallites were investigated theoretically using the dislocation model. Quantitative predictions for simple boundaries for cases in which the plane of the boundary contains the axis of relative rotation of the grains appear to agree with available experimental data. 27 ref. (M27)

159-M. The Structure of Evaporated Metal Films and Their Optical Properties. R. S. Sennett and G. D. Scott. *Journal of the Optical Society of America,* v. 40, Apr. 1950, p. 203-211.

Film structure for Ag, Au, Cu, Al, Sb, Ni, Pd, and Cr was observed in the electron microscope and correlated with optical properties. Rate of formation is shown to affect the structure and the optical properties, slow rates in general giving more aggregated structure and increased light absorption. The Garnett theory is used to explain the peculiar variation with thickness of the optical properties of thin metallic films in terms of structure and bulk properties of the metal. 25 ref. (M26, P17, L25, Ag, Au, Cu, Al, Sb, Ni, Pd, Cr)

160-M. A Lapping Technique to Improve the Image Quality of Electron Microscope Lenses. F. A. Hamm. *Journal of Applied Physics,* v. 21, Apr. 1950, p. 271-278.

A lapping technique that effectively reduces the effect of imperfect machining (misalignment of components). Critical faces and the bores through the pole piece are lapped with a series of powders (alumina) which increase in fineness until the final process is that of polishing. A set of jigs and laps (brass and hard wood), their specifications and use. (M21)

161-M. Revealing the Grain Structure of Common Aluminum Alloy Metallographic Specimens. L. J. Barker. *Transactions of American Society for Metals,* v. 42, 1950, p. 347-356.

Technique which utilizes bi-refringent qualities of electrolytically produced anodic films and requires polarized light for examination. Photomicrography is possible with the use of filters. 10 ref. (M21, M27, Al)

162-M. Relationship of Inclusion Content and Transverse Ductility of a Chromium-Nickel-Molybdenum Gun Steel. John Welchner and Walter G. Hildorf. *Transactions of American Society for Metals,* v. 42, 1950, p. 455-473; discussion, p. 473-485.

Previously abstracted from Preprint. (M27, Q23, AY) See item 4B-92, 1949.

163-M. Fractographic Study of Deformation and Cleavage in Ingot Iron. C. A. Zapffe and C. O. Worden. *Transactions of American Society for Metals,* v. 42, 1950, p. 577-602; discussion, p. 602-603.

Previously abstracted from Preprint. See item 4B-95, 1949. (M23, Q24, Fe)

164-M. The Crystal Structures of Metallic Uranium. Charles W. Tucker, Jr. *Transactions of American Society for Metals,* v. 42, 1950, p. 762-770.

Previously abstracted from *U. S. Atomic Energy Commission,* AECD-2716. See item 18-M, 1950. (M26, U)

165-M. The Effect of Vanadium and Carbon on the Constitution of High Speed Steel. Donald J. Blickwede, Morris Cohen, and George A. Roberts. *Transactions of American Society for Metals,* v. 42, 1950, p. 1161-1191; discussion, p. 1191-1196.

Previously abstracted from Preprint. See item 4B-93, 1949. (M24, TS)

166-M. Thorium-Carbon System. H. A. Wilhelm and P. Chiotti. *Transactions of American Society for Metals,* v. 42, 1950, p. 1295-1310.

Previously abstracted from *U. S. Atomic Energy Commission,* AECD-2718. See item 111-M, 1950. (M24, Th)

167-M. The Uranium-Manganese and Uranium-Copper Alloy Systems. H. A. Wilhelm and O. N. Carlson. *Transactions of American Society for Metals,* v. 42, 1950, p. 1311-1325.

Previously abstracted from *U. S. Atomic Energy Commission,* AECD-2717. See item 95-M, 1950. (M24, U, Mn, Cu)

168-M. The Electron Microscope in Metallurgy. Alfred L. Ellis. *American Iron and Steel Institute, Yearbook,* Preprint, 1950, 17 pages.

Replica technique and reliability of plastic replicas. Particle-size study and quantitative phase determination. Structure of martensite. Includes micrographs of carbon and alloys steels. (M21, CN, AY)

169-M. The Measurement of the Thermal Expansion of Single Crystals of Tin by an Interferometric Method.

B. G. Childs and S. Weintroub. *Proceedings of the Physical Society,* v. 63, sec. B, Apr. 1, 1950, p. 267-277.

Single crystals of tin were grown by the Kapitza method, their orientations measured, and the crystals converted into sets of three spacers for use in an interferometric dilatometer. The apparatus, its assembly, and method of use. Linear expansion coefficients of six crystals of different orientations. were measured from 30 to 220° C. 13 ref. (M23, P11, Sn)

170-M. Use of Diamond Dust for Polishing Metallographic Specimens of Nonferrous Metals and Alloys. E. C. W. Perryman. *Journal of the Institute of Metals,* v. 77, Mar. 1950, p. 61-64.

Rapid method for specimens containing two or more phases differing greatly in hardness, e.g. electrodeposited and galvanized coatings and multiphase structures. (M21, EG-a)

171-M. Electron Diffraction. Jean Ternisien. *Microtechnic,* v. 4, Jan.-Feb. 1950, p. 28-32. Translated from the French.

Fundamental principles, apparatus design, and applications. (M22)

172-M. Electron Diffraction Study of the Electropolishing of Single Crystals of Alpha and Beta Brass. (In French.) Noboru Takahashi. *Métaux & Corrosion,* v. 25, Feb. 1950, p. 37-43.

Includes diffraction patterns and crystal-lattice diagrams. (M22, Cu)

173-M. Corrosion Patterns Caused by Anodic Attack. Raymond Jacquesson and Jack Manenc. *Comptes Rendus* (France), v. 230, Mar. 6, 1950, p. 959-960.

Utilization of etch patterns for determination of crystal structure of metals. Results and conditions for electrolytic etching of aluminum. (M21, Al)

174-M. Specific Etch Colorations on Iron-Silicon Alloys. A New Rapid Method for Identifying High-Silicon Iron Alloys. (In German.) E. Fitzer. *Werkstoffe und Korrosion,* v. 1, Mar. 1950, p. 103-104.

Electrographic method which consists of anodic oxidation of the alloys, followed by tinting with methylene blue. It is specific for Si in Fe and, since it brings out the microstructure of the alloy, it is suitable for metallographic examination. (M21, S11, Fe)

175-M. Transformation of the β-Phase in the Cu-Al System and the Effect of Mn Additions Upon It. V. Concerning the Relationships Among the Metastable Phases and Their Crystal Structures. (In Japanese.) Isao Tarora. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Sept. 1949, p. 1-4.

Atomic arrangements of supercooled structures of the β-phase (β_1, β', and γ') and their relationships. (M26, Cu, Al)

176-M. Single-Step Quartz Replica for Electron-Microscopic Investigation. (In Russian.) L. I. Zemlyanova, Ya. M. Kushnir, and A. I. Frimer. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Feb. 21, 1950, p. 991-993.

The technique of replica formation for several specific steels and nonferrous metals and alloys. Advantages of this type of replica. (M21)

177-M. Polarized Light Shows Nature of Plastic Deformation in Monel Metal. *Wire and Wire Products,* v. 25, May 1950, p. 423-425, 453.

Based on "Stages in the Deformation of Monel as Shown by Polarized Light", D. H. Woodard, *Journal of Metals* (Technical Section). See item 4C-115, 1949. (M27, Q24, Ni)

178-M. Caustic Etching Detects Fatigue Damage. Paul W. Boone. *Iron Age,* v. 165, May 18, 1950, p. 99-100.

Procedure based on use of a caustic etch plus microscopic examination at 10X-20X magnification which has proved to be very effective in detecting early fatigue damage in Al alloys. (M21, Q7, Al)

179-M. (Book) **Beiträge zur Metallkündlichen Analyse.** (Contributions to Metallurgical Analysis.) P. Klinger and W. Koch. 104 pages. 1949. Verlag Stahleisen, Düsseldorf, Germany. 15 DM.

Consists of three separate papers on isolating nonmetallic inclusions from carbon and alloy steels, and on studying them physically and chemically. Electrolysis and "chlorine vacuum sublimation" were successfully employed. The isolated specimens were analyzed spectrographically and their structures studied by optical refraction, ultramicroscopy, and conventional microscopy. (M27, S11)

180-M. A Metallographic Technique for Cemented Carbides. W. H. Bleecker. *Iron Age,* v. 165, May 25, 1950, p. 71-74.

Ordinary polishing abrasives are too soft, hence diamond powder must be used. A suggested nomenclature of carbide phases is advanced. (M21, C)

181-M. Theory of Metals and Alloys. W. Hume-Rothery. *Metal Treatment and Drop Forging,* v. 17, Spring 1950, p. 15-22.

How a theoretical consideration of atomic systems may help to produce alloys with desired properties. Electron theory, its relation to formation of solid solutions, and factors involved in the combination of metal atoms, using Mg alloys as examples. (M25, N12, Mg)

182-M. Distribution of Inclusions in Forged Steel; Relation to Macroscopic and Microscopic Structures. P. Cattier, Ch. Dubois, J. Bleton, and P. Bastien. *Metal Treatment and Drop Forging,* v. 17, Spring 1950, p. 47-52. (Translated from the French.)

Tests were made on a medium-carbon Ni-Cr steel produced in an electric-arc furnace by four different processes. Methods of making, processing, and treatment of steel specimens, and their homogeneity. Micrographs show typical structures. (To be concluded.) (M27, D5, AY)

183-M. The Borides of Manganese. (In English.) Roland Kiessling. *Acta Chemica Scandinavica,* v. 4, No. 1, 1950, p. 146-159.

The binary system Mn-B was investigated by X-ray methods. Four intermediary phases all with metallic properties were found to exist and their structures determined. 16 ref. (M26, M24, Mn, B)

184-M. Investigations on the Binary Systems of Boron With Chromium, Columbium, Nickel, and Thorium, Including a Discussion of the Phase "TiB" in the Titanium-Boron System. (In English.) Lars-Henrik Andersson and Roland Kiessling. *Acta Chemica Scandinavica,* v. 4, No. 1, 1950, p. 160-164.

(M26, M24, B, Cr, Cb, Ni, Th, Ti)

185-M. Metallographic Applications of an Improved Technique for Obtaining Laue Diagrams. (In French.) A. Guinier and R. Le Roux. *Revue de Métallurgie,* v. 47, Mar. 1950, p. 149-157.

Details of technique. Diagrams are compared with micrographs of the same specimens to facilitate interpretation of the diagrams. (M22)

186-M. A New Universal Turn Table for Polished Sections and Its Possible Applications. (In German.) Hans Ehrenberg. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 3, Mar. 1950, p. 65-69.

Device facilitates the study of grain structures of ores and metals, and determination of optical constants of anistropic adsorbed crystals. (M26, M27)

187-M. Physical Investigations of Hard-Metal Alloys. (In German.) Helmut Krainer. *Archiv für das Eisenhüttenwesen,* v. 21, Mar.-Apr. 1950, p. 119-127.

Results of X-ray and magnetic investigation on W, WC, and WC-Co alloys for purposes of production control. The presence of the undesired double carbide $(WCo)_6C$ can be detected by measuring magnetic saturation. The formation of titanium carbide from TiO_2 and C tends to form defective lattices like the oxide from which it is formed. Compares results with those obtained by other authors. 45 ref. (M26, W, C)

188-M. Use of Fractography for Practical Evaluation of Low-Carbon Steel. (In Czech.) Vl. Zednik and Z. Kaderavek. *Hutnické Listy,* v. 5, Feb. 1950, p. 45-51.

Fractographic technique developed by Zapffe and co-workers in the U. S. Shows that various degrees of brittleness of worked ferritic carbon steel can be readily determined by fractography. The discontinuous precipitation of cementite does not appear to be the cause of brittleness. (M23, Q23, CN)

189-M. Application of the Electron Microscope in Metallography. (In Polish.) M. Rozsival, S. Vesely, and J. Chodorowski. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 2, No. 1, 1950, p. 81-87.

General principles and description of technique. Comparative electron and light micrographs obtained by the authors. Fields for practical application to metallurgical research. 12 ref. (M21)

190-M. Aluminum Oxide Replicas for Electron Microscopy Produced by a Two-Step Process. G. Hass and M. E. McFarland. *Journal of Applied Physics,* v. 21, May 1950, p. 435-436.

Method for preparing Al_2O_3 replicas of Al and other specimens. A thick layer of Al is evaporated onto the surface to be studied and pulled off the surface with Scotch Tape or cement-covered glass. Al_2O_3 is formed on the side of the Al film which has been in contact with the specimen by anodizing in 3% ammonium tartrate at about 40 volts. The film is released from its substrate in dilute HCl washed with distilled water, and mounted for electron-microscope investigation. Applicability is demonstrated with electron micrographs of various specimens. Films of 100-150A in thickness can be prepared. (M21)

191-M. Single Crystal X-Ray Techniques for Use With Alloys Requiring

Protective Atmospheres. Joseph Singer and F. H. Ellinger. *Journal of Applied Physics,* v. 21, May 1950, p. 467-468.

For obtaining X-ray diffraction data. (M22)

192-M. Fundamentals of the Working of Metals. Part XI. General Relations Between Grain Structure and Properties of Hotworked, Coldworked and Annealed Metals. George Sachs. *Modern Industrial Press,* v. 12, May 1950, p. 6, 8, 16, 36.

(M27, Q general)

193-M. Report of Committee E-4 on Metallography. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 513-516.

Previously abstracted from *American Society for Testing Materials,* Preprint No. 74, 1949. (M general)

194-M. Overheating and Burning; Detection in Steel Specimens by Microscopical Methods. A. Preece and J. Nutting. *Iron and Steel,* v. 23, May 11, 1950, p. 205-207; discussion, p. 262-264.

Previously abstracted for *Journal of the Iron and Steel Institute.* See item 41-M, 1950. (M 21, ST)

195-M. The Constitution of Magnesium-Rich Alloys of Magnesium and Zirconium. G. A. Mellor. *Journal of the Institute of Metals,* v. 77, Apr. 1950, p. 163-174.

An investigation of alloys containing up to 0.7% Zr. 12 ref. (M24, Mg)

196-M. Twin Relationships in Ingots of Germanium. W. C. Ellis. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, June 1950, p. 886.

Orientations of regions were determined by Laue X-ray back-reflection methods and plotted on stereograms. Results appear to be important in the general theory of solidification. (M27, N12, Ge)

197-M. Metallographic Re-Evaluation of the Indium-Zinc Eutectic Composition. S. C. Carapella, Jr. and E. A. Peretti. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, June 1950, p. 890-891.

Composition of the eutectic point. (M24, In)

198-M. The Electron Microscope in Metallurgy. Alfred L. Ellis. *Blast Furnace and Steel Plant,* v. 38, June 1950, p. 681-686.

Previously abstracted from *American Iron and Steel Institute,* Preprint, 1950. See item 168-M, 1950. (M21, CN, AY)

199-M. The Electron Diffraction Camera. Oliver Row. *Trend in Engineering at the University of Washington,* v. 2, July 1950, p. 21-23.

Camera incorporated in the R.C.A. electron microscope to permit operation to be shifted from one application to the other in a matter of minutes. Use to study transmission and reflection patterns. (M22)

200-M. The Borides of Some Transition Elements. (In English.) Roland Diessling. *Acta Chemica Scandinavica,* v. 4, No. 2, 1950, p. 209-227.

A comprehensive discussion of the structural work on the borides, including tables of axial lengths and interatomic distances. Structures are discussed with respect to the arrangement of boron atoms. 34 ref. (M26, B)

201-M. A Lithium Tungsten Bronze of Perovskite Type. (In English.) Arne Magneli and Robert Nilsson. *Acta Chemica Scandinavica,* v. 4, No. 2, 1950, p. 398.

Preparation and testing by means of X-ray photographs and microscopic examination. (M21, Cu)

202-M. The Effect of Cold-Work Distortion on X-Ray Patterns. B. E. Warren and B. L. Averbach. *Journal of Applied Physics,* v. 21, June 1950, p. 595-599.

With modern experimental technique, it is possible to measure a peak shape with sufficient accuracy to justify an interpretation based on the precise shape of the reflection. The corrected shape is represented by a cosine Fourier series and a set of A_n coefficients determined. A plot of A_n coefficients vs. n will distinguish between distortion and particle-size broadening. From the coefficients, root-mean-square values of strain are obtained. Decrease in these values for increasing length is a direct indication of nonuniform nature of the strains in cold worked metal. (M22, Q24)

203-M. Grain Size Effect in Creep of Austenite. *Metal Progress,* v. 57, June 1950, p. 798, 800, 802. Translated and condensed from "Grain Size of High-Alloy Austenite as a Factor in Its High-Temperature Strength", A. M. Borzdyka.

Previously abstracted from *Izvestiya Akademii Nauk SSSR.* See item 4B-69, 1949. (M27, Q3, SS)

204-M. Magnetic Test for Hardenability. *Metal Progress,* v. 57, June 1950, p. 816, 818, 822, 824, 826, 830, 834, 836, 838. Translated and extracted from "Determination of the Depth of Penetration of the Martensitic Zone in Hardened Steels by a Magnetic

Method", M. V. Dekhtyar.

Previously abstracted from *Zhurnal Tekhnicheskoi Fiziki.* See item 108-M, 1950. (M23, J26, ST)

205-M. Ternary Compound Formation of Aluminum Alloys. *Industrial Heating,* v. 17, June 1950, p. 1068. Condensed from paper by D. W. Wakeman and G. V. Raynor.

Experimental studies of the Al-Mn-Mg and Al-Mn-Ag systems made in connection with the role of transitional metal solutes in Al-rich alloys. (M24, Al)

206-M. Micrographic Detection of Temper Brittleness in Low-Alloy Steels. P. A. Jacquet. *Sheet Metal Industries,* v. 27, June 1950, p. 511-512.

Electropolishing technique and its application to two commercial steels. (M21, AY)

207-M. On the Stresses and Energies Associated With Inter-Crystalline Boundaries. J. H. Van Der Merwe. *Proceedings of the Physical Society,* v. 63, sec. A, June 1, 1950, p. 616-637.

Models, largely based on the assumptions introduced bv Peierls and Nabarro in dealing with a single dislocation, are used in calculations on three types of intercrystalline boundaries, namely, a boundary due to a difference of atomic spacing, a twist boundary, and a symmetrical tilt boundary. Application of the results to the theory of orinated overgrowths, developed by Frank and the present author. 16 ref. (M26, Q24)

208-M. Inhomogeneity of Deformation in Metal Single Crystals. R. W. K. Honeycombe. *Proceedings of the Physical Society,* v. 63, sec. A, June 1, 1950, p. 672-673.

Results of an investigation of local orientation changes in deformed Al crystals by means of a modification of the Berg method. (M26, Q24)

209-M. Some Effects of Austenitic Grain Size and Metallurgical Structure on the Mechanical Properties of Steel. G. M. Sinclair and T. J. Dolan. *American Society for Testing Materials,* Preprint 15, 1950, 30 pages.

Studies were made of SAE 1045, 2340 and 3140 steels to determine changes in mechanical properties accompanying large increases in austenitic grain size. Each of the steels was heat treated to produce two general types of microstructure. Influence of austenitic grain size on both pearlitic and tempered martensitic types of microstructure at the same hardness level was investigated. 50 ref. (M27, Q general, ST)

210-M. X-Ray Study of the Sigma Phase in Various Alloy Systems. Pol Duwez and Spencer R. Baen. *American Society for Testing Materials,* Preprint 47, 1950, 7 pages.

Critically reviews X-ray diffraction data on the sigma phase in the binary alloys of Fe, Co, Ni, Cr, and V. Although the crystal structure of the sigma phase is still unknown, a tentative tetragonal unit cell is suggested to describe the structure, at least as a first approximation. On the basis of this cell, lattice parameters of the various binary sigma phases are computed. The case of a ternary sigma solid solution in the Fe-Cr-Mo system, and the influence of Mo on the lattice parameter of sigma. (M26, Fe, Co, Ni, Cr, V)

211-M. Identification and Mode of Formation and Re-Solution of Sigma Phase in Austenitic Chromium-Nickel Steels. E. J. Dulis and G. V. Smith. *American Society for Testing Materials,* Preprint 50, 1950, 27 pages.

A comprehensive investigation of the etching characteristics of the several phases occurring in austenitic stainless steels, supplemented by X-ray diffraction and magnetic-permeability studies. Suggests procedures by which sigma, carbide, and ferrite phases can be differentiated, with certain exceptions, under the microscope. Mode of formation and re-solution of sigma. Transient formation of ferrite was detected during re-solution of sigma at a temperature above its stable range. 10 ref. (M26, N8, SS)

212-M. Sigma Phase and Other Effects of Prolonged Heating at Elevated Temperatures on 25 Per Cent Chromium, 20 Per Cent Nickel Steel. G. N. Emmanuel. *American Society for Testing Materials,* Preprint 52; 1950, 18 pages.

Mechanical properties, identification of sigma phase, and grain growth. 13 ref. (M26, N3, Q general, SS)

213-M. Report of Committee E-4 on Metallography. *American Society for Testing Materials,* Preprint 103, 1950, 53 pages.

Includes first progress report of Subcommittee XI on Electron Microstructure of Steel. A series of pieces of eutectoid steel were heat treated to specific microstructures. These pieces were divided into specimens which were supplied to 12 cooperating laboratories for electron microscope study. An extensive series of comparative electron and light micrographs illustrates the various structures observed. (M21, ST)

214-M. A High-Temperature Debye-Scherrer X-Ray Camera. E. C. Williams. *Journal of Scientific Instruments*, v. 27, June 1950, p. 154-157.

Camera designed primarily for Debye-Scherrer examination at high temperatures of flat solid specimens, using side-reflection technique. In metallography such specimens are sometimes preferable to powders, and they permit direct temperature measurement by means of an attached thermocouple. Mechanism which also provides simple rotation for powder specimens and independent azimuthal oscillation so that the camera may be used for X-ray spectroscopic analysis. (M22, S11)

215-M. The Structure of Co_2Al_9. (In English.) Audrey M. B. Douglas. *Acta Crystallographica*, v. 3, Jan. 1950, p. 19-24.

Results of the electron counts, and also forms of the first prominent Brillouin zones for both Co_2Al_9 and Co_2Al_5 are in agreement with the hypothesis that in electron-rich phases transition elements absorb electrons from the structure as a whole. 25 ref. (M26, Co, Al)

216-M. Compounds of Uranium With the Transition Metals of the First Long Period. (In English.) N. C. Baenziger, R. E. Rundle, A. I. Snow, and A. S. Wilson. *Acta Crystallographica*, v. 3, Jan. 1950, p. 34-40.

Previously abstracted from *U. S. Atomic Energy Commission*, AECD-2598 item 17-M, 1950. (M26, U)

217-M. The Borides of Some Transition Elements. (In English.) Roland Kiessling. *Acta Chemica Scandinavica*, v. 4, No. 2, 1950, p. 209-227.

Includes the metals Cr, Mn, Ni, Zr, Cb, Mo, Ta, W, and Th. Phase analyses and structure determinations of the intermediary phases. Survey of results including a discussion of the structures, including some reported by other investigators. 34 ref. (M26, B)

218-M. The Bismuth Sulfide-Antimony Trisulfide System Bi_2S_3-Sb_2S_3. (In German.) Rudolf Vogel and Walter von Mässenhausen. *Zeitschrift fur Metallkunde*, v. 41, Mar. 1950, p. 75-80.

Composition of different equilibrium phases at specific points in the Bi-Sb-S system, and structure of the Bi-rich Bi-S alloys. 18 ref. (M24, Bi, Sb, S)

219-M. Measurement by Means of an Interference Counting Tube of the Diffuse Dispersion of X-Rays by Crystals and the Effect of a Plastic Deformation on Them. (In German.) Gustav Wagner and Albert Kochendorfer. *Annalen der Physik*, ser. 6, v. 6, Sept. 19, 1949, p. 129-145.

Investigated on Zn monocrystals and Al polycrystals. Apparatus and procedure. 35 ref. (M22, M26, Zn, Al)

220-M. The Intergrowth of Copper With Its Lower Oxide. (In German.) Erich Menzel. *Annalen der Physik*, ser. 6, v. 5, Nov. 26, 1949, p. 163-180.

Crystallography as a specific example of the combination of two cubic lattices with different lattice constants, and because its clarification is basic to measurement of the rectifier effect of monocrystalline specimens and thus may explain the mechanism of blocking-layer rectifiers. 18 ref. (M26, Cu)

221-M. Possible Dependence of Structure on Metal-Electrode Potentials. (In German.) Wolfgang Lorenz. *Zeitschrift fur Naturforschung*, v. 5a, May 1950, p. 283-291.

Dependence of metal-electrode potential on crystal size and crystallographic surface structure. Conclusions based on the statistical-thermodynamic theory of electrode potentials, the Kossel-Stranski crystal-growth theory, and some results of electron-emission investigation. 80 ref. (M26, P15)

222-M. Micrographic Study of the Surface Structure of the Copper-Zinc Solid Solution Subjected to Abrasion. (In French.) P. A. Jacquet. *Metallurgia Italiana*, v. 42, Feb. 1950, p. 43-49.

Surface perturbations (strain hardening) induced on a Cu-Zn alloy by abrasion with emery paper. Micrographic technique designed to disclose even extremely small amounts of plastic deformation, based on anodic etching in a very dilute aqueous solution of sodium hyposulfite. Different phenomena of deformation by abrasion, which are also interesting from the standpoint of the mechanism of creep deformation. The corrosion phenomenon. 15 ref. (M27, Q9, Q3, Cu, Zn)

223-M. Study of Metal Surfaces With the Electron Microscope. (In Italian.) W. Feitknecht and K. Huber. *Metallurgia Italiana*, v. 42, Feb. 1950, p. 53-57.

Methods for obtaining replicas of the etched metal surface to be observed with the electron microscope. The etch is always preceded by electropolishing. Many electron micrographs—chiefly corrosion figures—obtained on various metals with the electron microscope of the Institute of Inorganic Chemistry and Physics of the University of Berne. 10 ref. (M21)

224-M. X-Rays Tell a Metal's Fortune. P. K. Koh. *Steel Horizons*, v. 12, Summer 1950, p. 10-11.

Elementary explanation of use of X-ray diffraction for structural analysis of metals. (M22)

225-M. Physics and Metallurgy. (In German.) G. Masing. *Metall,* v. 4, May 1950, p. 171-178.

Metallurgical phenomena, such as intermetallic crystals, solid solutions, plastic deformation, and mechanical damping, from the standpoint of physics (molecular and atomic structures). 17 ref. (M26, Q24, Q8)

226-M. Structure and Commercial Production of Corrosion Resistant Magnesium-Manganese Alloys. (In German.) A. Schneider and Henni Stobbe-Scholder. *Metall,* v. 4, May 1950, p. 178-183.

Characteristic features of the Mg-Mn constitution diagram and the mutual solubility of these two components at different temperatures; also different commercial methods of producing the Mg-rich alloys. Tests and experience have shown that presence of Fe greatly reduces the resistance of this alloy to corrosion. 22 ref.
(M24, E general, R general, Mg)

227-M. Determining the Constitution of Metal Systems in the Solid State by Measuring Their Electrical Resistances. (In German.) H. Vosskühler. *Metall,* v. 4, June 1950, p. 231-235.

The constitution diagrams of alloys can be established by determining either conductivity isotherms or temperature-resistance curves at room temperatures. Superiority over older methods is claimed. (M24)

228-M. Electron Microscopy in the United States. W. W. MacDonald. *Electronics,* v. 23, Aug. 1950, p. 66-69.

Apparatus, procedures, and applications. Suggestions for improvement of future designs and techniques.
(M21)

229-M. Internal Motion and Molecular Structure Studies by Electron Diffraction. II. Interpretation and Method. J. Karle and I. L. Karle *Journal of Chemical Physics,* v. 18, July 1950, p. 957-962.

Application of a recently developed objective procedure to analysis of electron-diffraction photographs from more complex molecules. Some of the theoretical and experimental aspects of the procedure. Physical significance of measured vibrational amplitudes, method for drawing a background line, calibration of photographic plates, and computation of intensity curves by means of IBM machines. (M22)

230-M. Atomic Space-Lattice and the Metallic State. T. A. Hoffmann. *Journal of Chemical Physics,* v. 18, July 1950, p. 989-990.

A simple linear model for a metal was developed by Hoffmann and Konya on the basis of the molecular orbital method. These results are now extended to the space model using some mathematical results of Rutherford. Provisionally this method is applied to metals of simple cubic-lattice structures for the case of a very large lattice constant. (M26)

231-M. Improvements in Methods for Preparing Thin Sections of Rock. Harold L. Gibbs and LaMar G. Evans. *U. S. Bureau of Mines,* Report of Investigations 4711, June 1950, 6 pages.

Established and several new techniques used for microscopic examination of rocks, ores, and metallurgical products. (M21)

232-M. The Effect of Electron Concentration on the Lattice Spacings in Magnesium Solid Solutions. H. Jones. *Philosophical Magazine,* ser. 7, v. 41, July 1950, p. 663-670.

The hypothesis that change in the c/a ratio in Mg solid solutions is due to the changes in the Fermi energy, arising from distortion of the Brillouin zone, is developed into a more general and quantitative theory. The case of monovalent solutes is considered, and agreement with experiment is shown to be satisfactory. Results permit deductions to be made regarding the density of electronic states in pure Mg.
(M26, Mg)

233-M. Polishing Metallographic Specimens of Non-Ferrous Metals and Alloys; Use of Diamond Dust. E. C. W. Perryman. *Industrial Diamond Review,* new ser., v. 10, June 1950, p. 179-181.

See abstract from *Journal of the Institute of Metals,* item 170-M, 1950.
(M21, EG-a)

234-M. Summarized Proceedings of a Conference on X-Ray Analysis—Leamington Spa, 1949. C. H. Carlisle and A. E. De Barr. *British Journal of Applied Physics,* v. 1, July 1950, p. 161-171.

The first session was devoted to a discussion on "The interaction of structure and chemical behavior" and the second to "Geiger counter techniques in X-ray analysis". Papers and accompanying discussion are summarized. 45 ref. (M23)

235-M. The Crystal Structure of Mo_3Si. (In English.) D. H. Templeton

and Carol H. Dauben. *Acta Crystallographica,* v. 3, July 1950, p. 261-262.

Structure was determined from powder-diffraction patterns. The structure is that of β-tungsten and the compound is isostructural with Cr_3Si and V_3Si. (M26, Mo, Si)

236-M. A New Weissenberg Technique Using a Double Slit. (In English.) H. P. Stadler. *Acta Crystallographica,* v. 3, July 1950, p. 262-264.

Describes a new method of recording the nth and zero layers of the reciprocal lattice simultaneously by means of a Weissenberg goniometer with two screen slits. (M23)

237-M. An Integrating Weissenberg Apparatus for X-Ray Analysis. (In English.) E. H. Wiebenga and D. W. Smits. *Acta Crystallographica,* v. 3, July 1950, p. 265-267.

With the modified instrument described, it is possible to measure the integrated reflection intensities with an accuracy equal to, or even better than, that obtained with an integrating photometer, and in a time comparable with that required for visual estimation. (M23)

238-M. A Geiger-Counter Technique for the Measurement of Integrated Reflexion Intensity. (In English.) W. Cochran. *Acta Crystallographica,* v. 3, July 1950, p. 268-278.

A Geiger-counter spectrometer is used for single-crystal measurements. Two methods by which integrated reflection intensity may be measured in a short time, despite the nonlinear response of the Geiger counter to X-ray intensity. Advantages and disadvantages of the balanced-filter method of monochromatization. Relation between counting rate and X-ray intensity. 14 ref. (M23)

239-M. Precision Measurements of Lattice Parameters of Non-Cubic Crystals. (In English.) A. Taylor and R. W. Floyd. *Acta Crystallographica,* v. 3, July 1950, p. 285-289.

Extrapolation method and its application to Co and Ni_3Ti. 18 ref. (M23, Co, Ni, Ti)

240-M. Anomalous X-Ray Reflexions From Copper Crystals. (In English.) W. A. Rachinger. *Acta Crystallographica,* v. 3, July 1950, p. 312-313.

Phenomenon is shown to be due to a double reflection of the incident X-ray beam, first by a (111) and then by a (113) plane. (M22, Cu)

241-M. Two Aids for the Calculation of Crystal Structure Factors. (In English.) G. Hagg. *Acta Crystallographica,* v. 3, July 1950, p. 315-316.

Simple calculating-machine procedures. (M23)

242-M. Double-Diffraction Effects on X-Ray Diagrams From Polycrystalline Test Specimens of an Aged Ag-Cu Alloy. (In Russian.) A. I. Pashilov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 72, May 11, 1950, p. 281-283.

Investigated on coarse-grained specimens from a saturated solid solution of Ag-Cu containing 6.5% Cu, subjected to various heat treatments. After annealing at 250° C. for more than 25 min., a definite double-diffraction effect was observed. Probable causes of this phenomenon are indicated on the basis of theoretical considerations. (M22, Ag)

243-M. The Determination of Electron Microscope Magnification. R. S. Pease. *Journal of Scientific Instruments,* v. 27, July 1950, p. 182-186.

Method in which movements of the object and image are measured and compared. Movements of the specimen stage are investigated directly with a variable-gap Fabry-Perot interferometer mounted inside the microscope. Movements of the order of 5μ are controlled and measured to within 1%. Mechanical measurement of specimen movements is capable of the same order of accuracy. (M21)

244-M. Increase of Temperature in Metallic Test Specimens When Investigated in the Electron Microscope. (In French.) Hubert Forestier, Charles Haasser, and Micheline Uhl. *Comptes Rendus* (France), v. 230, June 12, 1950, p. 2080-2082.

The above phenomenon was studied systematically for different grain sizes and for metals located throughout the periodic table. (M21, M27)

245-M. Application of Electron Microscopy in the Study of Cr-Mo Steels Subjected to Creep at High Temperatures. (In French.) P. Coheur, L. Habraken, and J. Hébert. *Revue de Métallurgie,* v. 47, June 1950, p. 472-476.

Three types of Cr-Mo steel were investigated at 550° C. under loads of 16 and 19 kg. per sq. mm. Several conclusions concerning transformations taking place under such conditions. Photomicrographs and electron micrographs. (M21, Q3, AY)

246-M. Grain Size Measurement; Details of a New Microscope Fitting. G. T. Callis and R. S. Moore. *Metal Industry,* v. 77, Aug. 4, 1950, p. 67-68, 71.

Instrument eliminates the necessity of measuring each intercept

separately, thus greatly reducing time requirements. (M21, M27)

247-M. Physical Chemistry of Metallurgical Processes. IV. Structure of Solid Phases and Mechanism of Metallurgical Reactions Between Gases and Solids. (In French.) Maurice Rey. *Revue de Métallurgie,* v. 47, Apr. 1950, p. 260-270.

Continues extensive descriptive review of the literature. 36 ref. (To be continued.) (M26, N15)

248-M. The Coordinate Scheme in Crystalline Boron. T. N. Godfrey and B. E. Warren. *Journal of Chemical Physics,* v. 18, Aug. 1950, p. 1121-1122.

Results of Fourier analysis of X-ray powder-diffraction study. The radial distribution curve is plotted. (M22, B)

249-M. A Statistical Partial Treatment of the Orientation of Two-Dimensional Binary Solid Solutions. (In German.) Iris Runge. *Annalen der Physik,* ser. 6, v. 7, May 20, 1950, p. 240-247.

Mathematical analysis. (M24)

250-M. Density and Lattice Structure of the Compounds Mg_2Pb, Mg_2Sn, and Mg_2Ge. (In German.) Georg Brauer and Joachim Tiesler. *Zeitschrift für Anorganische Chemie,* v. 262, June 1950, p. 319-327.

Experimental procedure, physical properties, and crystal structure of the above compounds. 16 ref. (M26, P10, Mg, Pb, Sn, Ge)

251-M. The Compounds LiMgP, LiZnP, and LiZnAs. (In German.) H. Nowotny and K. Bachmayer. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften,* v. 81, June 15, 1950, p. 488-496.

Preparation and X-ray studies of above compounds as well as some of their physical properties. The arsenide is metallic in character. (M26, Li, Mg, Zn)

252-M. X-Ray Interferences of Materials With Hydrostatic Lattice Distortions. (In German.) Rolf Hosemann. *Zeitschrift für Physik,* v. 128, June 20, 1950, p. 1-35.

Results of theoretical analysis of the above. 37 ref. (M26)

253-M. Conditions for Formation of Intermetallic Phases of Types of $MgCu_2$, $MgZn_2$, and $MgNi_2$. (In Russian.) P. I. Kripyakevich and E. E. Cherkashin. *Uspekhi Khimii* (Progress in Chemistry), v. 19, May-June 1950, p. 361-378.

Reviews above, on basis of the literature and the authors' experiments. 59 ref. (M26, Mg, Cu, Zn, Ni)

254-M. Exact Metallurgical Control of Aluminum Alloy Macrostructure Eliminates Warpage. *Steel,* v. 127, Aug. 28, 1950, p. 90.

Results of studies by the Harvey Machine Co. It was found that a macrostructure consisting of uniformly small grains results in minimized distortion during machining operations. (M28, G17, Al)

255-M. Metal Fractures Modeled by Other Materials. A. M. Sullivan and J. A. Kies. *Journal of Metals,* v. 188, Sept. 1950, p. 1090-1091.

Photomicrographs show similarity of fracture structures between various metallic and nonmetallic materials. Importance of distinguishing between markings characteristic of the material under observation and those characteristic of fracture itself. (M27, Q26)

256-M. The Structure of Intermediate Phases in Alloys of Titanium With Iron, Cobalt, and Nickel. Pol Duwez and Jack L. Taylor. *Journal of Metals,* v. 188, Sept. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1173-1176.

Results of investigation compared with those previously published. (M26, Ti, Fe, Co, Ni)

257-M. The Insides of Metals. Carl A. Zapffe. *Physics Today,* v. 3, Sept. 1950, p. 13-19.

Work of the author using the microscope technique known as "fractography". Practical and fundamental results. "Micellar" theory proposed by the author. (M23)

258-M. The Borides of Uranium and Thorium. Leo Brewer and others. *U. S. Atomic Energy Commission,* AECD-2823, Feb. 14, 1950, 6 pages.

The phases of the U-B and Th-B systems were investigated by means of X-ray powder diffraction patterns of samples 25-85 at. % B. Results are discussed. (M26, B, Th, U)

259-M. The Electron Microscope in Metallurgy. Alfred L. Ellis. *Year Book of the American Iron and Steel Institute,* 1950, p. 398-414; discussion, p. 414-422.

Previously abstracted from preprint. See item 168-M, 1950. (M21, CN, AY)

260-M. A High-Low Temperature Microscope Stage. R. E. Cech. *Review of Scientific Instruments,* v. 21, Aug. 1950, p. 747-749.

Stage which permits microscopic observation of metal specimens from the temperature of liquid nitrogen to an upper temperature usually determined by the melting point of the specimen. It consists of a vacuum-tight copper chamber cooled by

water or liquid nitrogen, in which the specimen is heated electrically. A quartz window permits "at temperature" observation of the specimen. 11 ref. (M21)

261-M. Ultra-Violet Photography of Hot Metal Surfaces. G. A. Jones. *Photographic Journal,* v. 90B, July-Aug. 1950, p. 99, 81.

Techniques employed. Photographs show results of photographing the same piece of metal at the same temperature by its own radiation on a panchromatic plate; by means of a 500-watt mercury lamp; and by means of a blue filter and intense white lighting. (M21)

262-M. Flash Radiography. C. G. Pollitt. *Photographic Journal,* v. 90B, July-Aug. 1950, p. 104-107; discussion, p. 107-109.

Development of the X-ray tubes and associated electrical equipment for taking radiographs using an exposure time of one microsecond or less. A brief reference is made to kineradiography using extremely short exposure times. Includes radiographs and circuit diagrams. (M23, S13)

263-M. The Quaternary System Aluminium-Iron-Cobalt-Nickel, With Reference to the Role of Transitional Metals in Alloys. G. V. Raynor and M. B. Waldron. *Proceedings of the Royal Society,* ser. A, v. 202, Aug. 7, 1950, p. 420-438.

Compares theoretical and experimental results. (M24, Al, Co, Fe, Ni)

264-M. An Autoradiographic Method for Study of Segregation in Steels. (In French.) André Kohn. *Comptes Rendus* (France), v. 230, June 19, 1950, p. 2201-2203.

A new method using a radioactive alloy, or by subjection of the sample to radiation of thermal neutrons in the atomic pile. Results of a typical investigation. (M23, ST)

265-M. Structure of Light Alloys for Casting. (In French.) Louis Grand. *Fonderie,* June 1950, p. 2081-2089.

Microstructure, mechanism of crystallization, conditions of melting, solidification of metal in the mold, and development of the grains for seven different Al alloys. (M27, N12, Al)

266-M. Study of Imperfect Crystals by Powder Photographs. A. J. C. Wilson. *Research,* v. 3, Sept. 1950, p. 394-399.

A review, illustrated with diagrams. 67 ref. (M26)

267-M. (Book) **Contribution a l'Emploi des Methodes Optiques en Metallographie Microscopique** (Use of Optical Methods in Metallographic Microscopy). T. Cambon. 107 pages. 1949. Publications Scientifiques et Techniques du Ministere de l'Air, 2 rue de la Porte d'Issy, Paris, France. 500 fr.

Thesis of this book is that a great deal can be learned, both as to the nature of the phases and as to their crystallographic characteristics, by examination in the unetched condition, using normally incident polarized light and a crossed analyzer. Regards the reflecting power of an opaque material as of interest equal to that of the refractive index of a transparent material. Characteristics of the phases in the Cu-Sn systems and of about 24 silicides. Theory and practical details of the technique. (From review in *Metal Industry.*) (M21)

268-M. (Book) **Materiewellen und ihre Interferenzen.** (Material Waves and Their Interferences.) M. von Laue. 392 pages. 1948. Akademische Verlagsgesellschaft, Geest & Portig K. G., Leipzig, Germany.

A brief historical outline of the electron and wave theory of matter; advanced theoretical and mathematical work in this field. (M25)

269-M. The Electron Microscope. A. E. Williams. *Canadian Chemistry and Process Industries,* v. 34, Sept. 1950, p. 724-728, 733.

Its importance in the examination of metals and in the determination of the crystal structure of minerals. Circuit diagrams. (M21)

270-M. Distribution of Inclusions in Forged Steel; Location of Silicates and Sulphides. P. Cattier, Ch. Dubois, J. Bleton, and P. Bastien. *Metal Treatment and Drop Forging,* v. 17, Summer 1950, p. 102-109.

Location of silicate and sulphide inclusions in forgings from acid, basic, and duplex casts. How certain laws can be applied to explain distribution of such inclusions. (M28, ST)

271-M. The System Silver-Magnesium-Antimony, With Reference to the Theory of Alloy Formation. B. R. T. Frost and G. V. Raynor. *Proceedings of the Royal Society,* ser. A, Sept. 7, 1950, p. 132-147.

System was studied by metallographic and X-ray methods. Results are presented in the form of isothermal diagrams at 550 and 450° C. Form of the equilibrium diagram in comparison with previous work. Shows that the effect of a compound formed by solute elements on the equilibrium diagram depends on its

heat of formation, which can be taken as a rough measure of its free energy. 14 ref.
(M24, P12, Ag, Mg, Sb)

272-M. Correspondence on the Paper—Electron Microscope Study of Quenched and Tempered Steel, by J. Trotter and D. McLean. *Journal of the Iron and Steel Institute*, v. 166, Sept. 1950, p. 17-18.

K. H. Jack discusses above paper (v. 163, 1949; see item 4B-96, 1949). Evidence for a proposed mechanism of martensite tempering has now been obtained from several sources. Includes authors' reply.
(M21, J29, ST)

273-M. Use of Aluminum Single Crystals in Focusing Techniques, Especially in X-Ray Spectrography. (In French.) Y. Cauchois, T. J. Tiedema, and W. G. Burgers. *Acta Crystallographica*, v. 3, Sept. 1950, p. 372-374.

Plate-shaped Al single crystals were prepared with an atomic plane of high density parallel or perpendicular to their surfaces. Such crystals, after suitable plastic bending, followed by an annealing treatment, were used as reflectors in focusing X-ray spectrographs and spectrometers, both of the transmission and the reflecting types. The intensities of the reflected beams were considerably higher than those obtained with elastically bent crystals of similar resolving power. 13 ref.
(M23, T8, Al)

274-M. Results of Further X-Ray Structural Investigations of the Iron-Carbon and Iron-Nitrogen Systems and of Related Interstitial Alloys. (In English.) K. H. Jack. *Acta Crystallographica*, v. 3, Sept. 1950, p. 392-394.

The "related interstitial alloys" are nickel nitride and nickel carbonitrides. Evidence indicates that so-called hexagonal Ni is really one of the above compounds. 21 ref.
(M24, M26, Fe, Ni)

275-M. Silicon Carbide of 594 Layers. Goro Honjo, Shizuo Miyake, and Takanori Tomita. *Acta Crystallographica*, v. 3, Sept. 1950, p. 396-397.

New modification having 594 layers based on the product 3x6x33. This fact is illustrated by oscillation and Laue photographs.
(M26, Si, C)

276-M. Systems of Molten Metals and Alloys. II. (In German.) Franz Sauerwald. *Zeitschrift für Metallkunde*, v. 41, Apr. 1950, p. 97-104.

Molten alloys may be composed of intermetallic compounds (frequently of a salt-like nature), solutions, and an intermediate group of undetermined character. X-ray studies of pure molten metals. Diagrams show statistical distribution of atoms under different conditions. 36 ref. (M26)

277-M. Measuring Grain Sizes of Polished Metal Specimens. (In German.) Hans Kostron. *Stahl und Eisen*, v. 70, Aug. 3, 1950, p. 713-715.

Brief illustrated review of different methods. 24 ref. (M27)

278-M. Metals and Alloys. The Pauling Hypothesis. W. Hume-Rothery, R. C. Pink, and A. R. Ubbelohde. *Annual Reports on the Progress of Chemistry*, v. 46, 1949, p. 42-56.

A general review, covering calculation of physical properties, coordination number and bond radii of metal atoms, Brillouin zones and alloy structures, and metallic orbitals. 42 ref. (M25, P general)

279-M. Crystallography, 1947, 1948, and 1949. *Annual Reports on the Progress of Chemistry*, v. 46, 1949, p. 57-85.

A general review: "Introduction" D. Crowfoot Hodgin; "Technique of Structure Analysis", G. J. Pitt; and "Crystal Chemistry", D. Crowfoot Hodgin. 66 ref. (M26)

280-M. An Electron-Diffraction Study of Certain Reactions and Surface Structures of Metals. (In French.) Robert Courtel. *Métaux & Corrosion*, v. 25, May 1950, p. 117-125; June 1950, p. 145-155.

Apparatus especially developed for this method of investigation. The second part describes physicochemical properties of freshly polished surfaces, in particular the Beilby layer, and activities of freshly polished surfaces in different atmospheres and in vacuum. June installment, which begins Part III, deals with variation of surface structures with method of casting. Preferential orientations caused by casting, and their classification; experimental determination of the surface temperature reached during casting for the case of cobalt; and a theoretical study of annealing by conduction. 35 ref. (To be continued.)
(M22, E25, J23)

281-M. Structure of Ferromagnetic Sheets Studied by Means of Electropolishing, Alternating Currents, and X-Rays. (In French.) J. Wyart and I. Epelboin. *Revue de Métallurgie*, v. 47, July 1950, p. 511-514.

Changes in magnetic properties of cold-rolled and of electropolished ferronickels (76-79% Ni) were studied as an indication of structural changes caused by rolling and electropolishing. Method of determination of relationship of electrical properties to crystal structure.

Practical application. 10 ref. (M21, P16, SG-n, p)

282-M. Crystal Structure and Grain Size of the Carbide Phase in Annealed Steel. (In Russian.) M. P. Arbuzov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, July 1, 1950, p. 83-86.

Carbides deposited from steel containing 1% C annealed at 100-700° C. were investigated by X-ray methods. Analysis indicated that the transition from the low-temperature state of the carbide phase into ordinary cementite is not followed by changes in the crystal structure of the carbide. (M26, N8, CN)

283-M. Determination of Oblique-Angle Elementary Cells by Electron Diffraction. (In Russian.) B. K. Vainshtein. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, July 1, 1950, p. 103-106.

Mathematical and graphical method. (M22)

284-M. The Ternary System Copper-Germanium-Silver. (In German.) H. Nowotny and K. Bachmayer. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften,* v. 81, Aug. 15, 1950, p. 669-678.

X-ray and metallographic studies, and thermal analyses, are supplemented by corrosion tests. 16 ref. (M24, R11, Cu, Ge, Ag)

285-M. The Crystal Structure of PdZn. (In German.) H. Nowotny and H. Bittner. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften,* v. 81, Aug. 15, 1950, p. 679-680. Brief discussion is supplemented by tabulated powder-diffraction data. (M26, Pd, Zn)

286-M. An X-Ray Study of Thermally Induced Stresses in Microconstituents of Aluminum-Silicon Alloys. John P. Nielsen and Walter R. Hibbard, Jr. *Journal of Applied Physics,* v. 21, Sept. 1950, p. 853-854.

Changing width of high-angle Debye X-ray diffraction lines from 10-40% Si-Al alloys during thermal cycling is interpreted in terms of stresses resulting from differences in thermal expansion of the microconstituents. 15 ref. (M22, P11, Al)

287-M. Generalized Microscopy and the Two-Wave-Length Microscope. M. J. Buerger. *Journal of Applied Physics,* v. 21, Sept. 1950, p. 909-917.

Theory of a microscope in which light of one wave-length is permitted to flow as far as the diffraction image of the object, when light of a second wave-length is substituted and continues to flow through the rest of the optical system. For such a generalized microscope, magnification depends not only on ordinary image-to-object distance ratio, but also on ratio of wave-lengths used. Utilizing X-rays and visible light, this second factor is about 10^4 diameters, and total magnification is of the order of $3X10^5$. This is enough to permit one to see an atom. Apparatus has been built which realizes this theory. 10 ref. (M21)

288-M. Intensity Correction Factors for X-Ray Spectrometer Transmission Pole Figure Determinations. Suzanne Van Dijke Beatty. *Journal of Applied Physics,* v. 21, Sept. 1950, p. 940-941.

Table computed to expedite reduction of intensity contours obtained with a recording X-ray spectrometer using the transmission method for pole-figure determination. The method is particularly suited for thin sheet material having very small grain size and is valuable in determination of textures of rolled materials. (A limited number of the tables is available for free distribution from the author at Westinghouse Research Laboratories, East Pittsburgh, Pa.) (M23)

289-M. Examination of Thin Overgrowths by Multiple Scattering of Electrons. L. G. Schulz. *Journal of Applied Physics,* v. 21, Sept. 1950, p. 942-943.

When the overgrowth is produced by evaporation and deposition in a vacuum, the deposit forming the overgrowth is occasionally too small to be detected easily. To enhance the scattering, the reflected beam from the substrate is used as the incident beam on the deposit. (M22)

290-M. Lattice Constant of Grey Tin. L. D. Brownlee. *Nature,* v. 166, Sept. 16, 1950, p. 482.

Presents values of improved accuracy. (M26, Sn)

291-M. Graticules as Guides in Electron-Microscope Metallography. E. De Haas. *Nature,* v. 166, Sept. 16, 1950, p. 482-483.

Technique for localization of a micrograph on the original specimen. It consists in cutting a fine graticule on the polished metal surface, using an instrument manufactured by a Swedish firm, which scribes a metal surface with lines of width less than 2μ. Typical results. (M21)

292-M. Phase Relationships in the Binary Systems of Nitrides and Carbides of Zirconium, Columbium, Titanium, and Vanadium. Pol Duwez and Francis Odell. *Journal of the Electrochemical Society,* v. 97, Oct. 1950, p. 299-304.

The mononitrides of Zr, Cb, Ti, and V, which have the same NaCl-type crystal structure as the corresponding carbides, are soluble in each other, with the exception of the pair ZrN-VN. As in the case of the carbides, this exception can be explained on the basis of the atomic-size rule governing the formation of solid solutions. It was also established that most of the carbide-nitride binary systems are of the solid-solution type, providing atomic diameters of the metal atoms do not differ by more than about 15%. 14 ref. (M26, Zr, Cb, Ti, V, C, SGh)

293-M. The Application of the Electron Microscope in Metallography. N. P. Allen. *Institute of Metals,* "Metallurgical Applications of the Electron Microscope", 1950, p. 1-18; discussion, p. 139-151.

Development and resolution now achieved in relation to the magnitude of objects of interest to the metallographer. Need for speed, easy change of magnification, and controlled choice of the area to be examined. Use of replicas. 25 ref. (M21)

294-M. Electron Microscopy in Metallurgy. Pierre Grivet. *Institute of Metals,* "Metallurgical Applications of the Electron Microscope", 1950, p. 19-36; discussion, p. 139-151.

Optical properties of the microscope are uniform for both the magnetic or electrostatic type. Describes an electrostatic type in detail, emphasizing recent developments. Reviews developments in the study of powders, steels, and age-hardenable nonferrous alloys. 52 ref. (M21)

295-M. The Use of the Electron Microscope in Metallurgical Research in Germany During and Since the War. H. Mahl. *Institute of Metals,* "Metallurgical Applications of the Electron Microscope", 1950, p. 37-41; discussion, p. 139-151.

Reviews the above mainly for the investigation of microstructures of Al alloys, Cu-Be alloys, and steel. 32 ref. (M21, Al, Cu, ST)

296-M. The Structure of Some Non-Ferrous Alloys as Revealed by the Electron Microscope. G. L. J. Bailey and Sheila Vernon-Smith. *Institute of Metals,* "Metallurgical Applications of the Electron Microscope", 1950, p. 43-55; discussion, p. 139-151.

Techniques for preparing replicas. Grain-boundary structure of high-tensile β brasses containing Al; grain-boundary precipitation in Al+7% Mg alloys in relation to their susceptibility to stress-corrosion; and examination of Al-bronzes, Al-Mn, and modified Al-Si alloys. (M21, Al, Cu)

297-M. A Replica Technique for the Examination of Fracture Surfaces With the Electron Microscope. J. Nutting and V. E. Cosslett. *Institute of Metals,* "Metallurgical Applications of the Electron Microscope", 1950, p. 57-63; discussion, p. 139-151.

Aluminum-pressing technique for preparing replicas of surfaces, otherwise inaccessible to electron microscopy. Technique was applied to an examination of fracture surfaces of temper-brittle steel, 4%-silicon steel, brittle mild steel, and pure iron. (M21, AY, CN, Fe)

298-M. The Dry Stripping of Formvar Replicas From Etched Metal Surfaces. J. Nutting and V. E. Cosslett. *Institute of Metals,* "Metallurgical Applications of the Electron Microscope", 1950, p. 65-74; discussion, p. 139-151.

Technique. Influence of etching conditions upon stripping of replicas from pearlite and sorbite was investigated for carbon steels. (M21, CN)

299-M. The Microstructure of a Water-Quenched Carburized Iron. J. Trotter, D. McLean, and C. J. B. Clews. *Institute of Metals,* "Metallurgical Applications of the Electron Microscope", 1950, p. 75-83; discussion, p. 151-164.

Specimens were examined after water quenching from 950° C. in the austenite region, and after quench-aging treatments in the α region. Electron micrographs show detail beyond that visible with the light microscope and reveal frequent films, apparently of high carbon content. (M21, N general, CN)

300-M. Electron Microscopy of Light-Metal Alloys. Fred Keller. *Institute of Metals,* "Metallurgical Applications of the Electron Microscope", 1950, p. 85-96; discussion, p. 151-164.

Use in the U. S. Specimen preparation and results. "Critical size" of precipitate particles to obtain optimum strength in age-hardening light-metal alloys appears to vary appreciably with type of alloy and hardening constituent. (M21, Al, Mg)

301-M. Observations on the Age-Hardening Process in an Aluminum-Copper Alloy. G. L. Bucknell and G. A. Geach. *Institute of Metals,* "Metallurgical Applications of the Electron Microscope", 1950, p. 97-102; discussion, p. 151-164.

Electron-microscope study of an Al+1% Cu alloy, using the Al_2O_3 replica method. A number of periodic structures are illustrated and discussed. (M21, N7, Al)

302-M. Elementary Slip Processes in Aluminium as Shown by the Electron Microscope. Arthur F. Brown. *Institute of Metals,* "Metallurgical Applications of the Electron Microscope", 1950, p. 103-114; discussion, p. 151-164.

Examination from −180 to 500° C. 10 ref. (M21, Q24, Al)

303-M. Studies in the Electron Microscopy of Nickel-Chromium Alloys. B. S. Cooper and G. A. Bassett. *Institute of Metals,* "Metallurgical Applications of the Electron Microscope", 1950, p. 115-119; discussion, p. 151-164.

Various methods of surface preparation. Silica replicas from specimens etched with a bromine-methanol reagent appeared to be most satisfactory. (M21, Ni)

304-M. A Note on the Examination of Metal Powders by the Electron Microscope. J. I. Morley. *Institute of Metals,* "Metallurgical Applications of the Electron Microscope", 1950, p. 121-124; discussion, p. 151-164.

Tungsten powders manufactured by different methods were examined. Effect of prolonged ball milling on particle size was also studied. Typical results. (M21, H11, W)

305-M. The Progress of Electron Microscopy of Metals in America (Excluding the Light Metals). C. M. Schwartz. *Institute of Metals,* "Metallurgical Applications of the Electron Microscope", 1950, p. 125-138; discussion, p. 139-151.

Methods of surface and replica preparation. Typical results. 27 ref. (M21)

306-M. A Metallurgical Investigation of Silver Chloride. R. D. Moeller, F. W. Schonfeld, C R. Tipton, Jr., and J. T. Waber. *American Society for Metals,* Preprint No. 7, 1950, 28 pages.

Microstructures, deformation, and mechanical and physical properties are presented to establish an analogy between silver chloride and metals. Similarities seem sufficient to allow its use as a "transparent metal" in metallurgical investigations. 36 ref. (M26, P general, Q general)

307-M. Structure of Permanent Magnet Alloys. A. H. Geisler. *American Society for Metals,* Preprint No. 9, 1950, 32 pages.

Constitution and structural data of Fe-Ni-Al alloys, Alnicos, Cunife, Cunico, Silmanal, Vectolite, and Vic-alloys. Transformation under heat treatment. Structure obtained by metallography and X-ray diffraction analyses. 41 ref.
(M24, N general, SG-n)

308-M. The Ternary System Chromium-Molybdenum-Iron. J. W. Putman, R. D. Potter, and N. J. Grant. *American Society for Metals,* Preprint No. 26, 1950, 24 pages.

A series of the above alloys was made up by induction melting under an inert atmosphere and purified by vacuum melting. Thermal analyses were made and liquidus temperatures determined. Effects of several heat treatments were observed and ternary isothermal sections drawn at 1300, 1100, and 900° C. X-ray diffraction data on Fe_3Mo_2 and the Fe-Mo sigma phase. 14 ref. (M24, J general, Cr, Fe, Mo)

309-M. The Ternary System Indium-Cadmium-Zinc. S. C. Carapella, Jr., and E. A. Peretti. *American Society for Metals,* Preprint No. 27, 1950, 20 pages.

System was studied on the basis of binary diagrams already reported and study of an additional 120 alloys by thermal, metallographic, X-ray and hardness-analysis methods. Hardness survey of the system. 19 ref. (M24, Cd, In, Zn)

310-M. Constitution and Mechanical Properties of Zirconium-Iron Alloys. E. T. Hayes, A. H. Roberson, and W. L. O'Brien. *American Society for Metals,* Preprint No. 29, 1950, 17 pages.

A diagram for the Zr-Fe system. Tensile data are given for hot rolled, quenched, drawn, and cold worked alloys. Heat resistance and hot strength. Includes tables, graphs, and micrographs. 14 ref.
(M24, Q23, Fe, Zr)

311-M. A Study of Cleavage Surfaces in Ferrite. E. P. Klier. *American Society for Metals,* Preprint No. 31, 1950, 19 pages.

Examined by X-ray, fractographic, and metallographic procedures. It was found that plastically-strained metal exists at such surfaces in coarse-grained ferrite over a wide range of testing conditions.
(M21, M23, Q24, Fe)

312-M. Phase Boundaries. *Metal Progress,* v. 58, Oct. 1950, p. 548, 550, 554. Condensed from "Application of X-Ray Methods to the Determination of Phase Boundaries in Metallurgical Equilibrium Diagrams", E. A. Owen and D. P. Morris.

Previously abstracted from *Journal of the Institute of Metals;* see item 11-385, 1949. (M27)

313-M. Metallography With Electron Streams. *Metal Progress,* v. 58, Oct. 1950, p. 580, 582, 586. 588, 590. Summary of papers published in "Metallurgical Applications of the Electron Microscope", Institute of Metals, London, 1950.

Book as a whole and individual

papers separately abstracted. See item 320-M and 293-M to 305-M. (M21)

314-M. Relative Energies of Grain Boundaries in Silicon Iron. C. G. Dunn, F. W. Daniels, and M. J. Bolton. *Journal of Metals,* v. 188, Oct. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1245-1248.

Grain boundary energies were determined for differences in crystal orientation for various series and temperature ranges. Micrographic data show movement and configurations of boundaries. (M27, Fe)

315-M. Crystallography of the Sigma Phase. Paul Pietrokowsky and Pol Duwez. *Journal of Metals,* v. 188, Oct. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1283-1284.

The method used was a graphical examination of differences in values of $\sin^2 \theta$ for adjacent lines of the powder-diffraction pattern. This method led to a complete indexing of the Cr-Co (60-40) pattern. Because of the strong similarity between the various sigma alloys, it was then possible to assign indexes to the patterns of Fe-Cr (50-50), Fe-Cr-Mo (30-30-40), Fe-V (50-50), Co-V (50-50), and Ni-V (50-50). (M26, Cr, Co, Fe, Mo, V, Ni)

316-M. A Standard Substance for Precise Electron Diffraction Measurements. F. W. C. Boswell. *Physical Review,* ser. 2, v. 80, Oct. 1, 1950, p. 91-92.

A vacuum-evaporated film of TlCl about 300A thick, deposited on a thin Formvar or collodion substrate, was found to provide a satisfactory standard material. A typical transmission electron-diffraction pattern is shown. (M21)

317-M. Identification of Structural Constituents of Stainless Steels. (In English.) J. C. Jongebreur and G. Vollers. *Metalen,* v. 4, Aug. 1950, p. 247-259.

Using a number of specimens of stainless steel, the reliability of various etching reagents and of a magnetic identification method was determined. Stainless steels used in practice and their compositions. Includes diagram for examination of stainless steels, based on a survey of etching reagents and their potentialities. (M21, SS)

318-M. High-Melting Silicides. Leo Brewer, Alan W. Searcy, D. H. Templeton, and Carol H. Dauben. *Journal of the American Ceramic Society,* v. 33, Oct. 1, 1950, p. 291-294.

The Ta-Si, Mo-Si, and W-Si were investigated for solid phases stable above 1900° K. Three new Ta-silicide phases, two new Mo-silicide phases, and one new W-silicide phase are reported besides the MSi_2 phases previously known. Crystal structure of Mo_3Si. Lower limits for eutectic temperatures for these three systems, and relative stabilities of metallic silicides of groups III through VII. 11 ref. (M26, N12, Si)

319-M. (Book) Electron Microscopy—Technique and Applications. Ralph W. G. Wyckoff. 258 pages. 1949. Interscience Publishers, 215 Fourth Ave., New York 3, N. Y. $5.00.

History of electron microscopes. Different types and adjustment of the instruments. Specimen preparation. Emphasis is on biological applications, although metallurgical and other applications are also briefly discussed. (M21)

320-M. (Book) Metallurgical Applications of the Electron Microscope. 164 pages. 1950. Institute of Metals, 4 Grosvenor Gardens, London, S.W.1, England. (Monograph and Report Series, No. 8). $3.50.

Presents 13 papers (abstracted separately) given at a symposium held at the Royal Institution, London, Nov. 16, 1949. (M21)

321-M. Single Crystal Copper Surfaces. T. N. Rhodin, Jr. *Journal of Applied Physics,* v. 21, Oct. 1950, p. 971-973.

Some surface-structure characteristics of a metal single crystal and the preparation of single-crystal Cu plates. Using physical micro-adsorption isotherm of nitrogen at 78.1° K., electron diffraction, and X-ray diffraction methods, the conclusion is tentatively made that the surfaces are essentially planar on a molecular scale, and that the surface atoms are arranged in an approximately undistorted lattice. (M26, Cu)

322-M. Single Wave-Length X-Rays for Powder Diffraction. L. K. Frevel and P. P. North. *Journal of Applied Physics,* v. 21, Oct. 1950, p. 1038-1039.

Shows that WLα radiation filtered through a Cu-Zn foil is essentially monochromatic and has the advantage over filtered CuKα or MoKα radiation in that the WLα_1 line is approximately ten times as intense as the WLα_2 line. Moreover, the comparatively wide $\Delta\lambda$ = spread (WLα_2 = WLα_1) results in very sharp powder lines at those Bragg angles where the CuKα doublet or MoKα doublet is unresolved. (M22)

323-M. Electron Microradiography of Electrodeposited Metals. Rolf Weil

and Harold J. Read. *Journal of Applied Physics,* v. 21, Oct. 1950, p. 1068.

New method of examining specimens directly in the electron microscope without the aid of replicas. This method was most valuable in study of the initiation of plating, revealing some features not seen when conventional techniques are employed. It should also be a useful tool in the study of other metallurgical phenomena. (M21)

324-M. Apparatus for Cutting Metals Strain-Free. Robert Maddin and W. R. Asher. *Review of Scientific Instruments,* v. 21, Oct. 1950, p. 881-883.

Apparatus, in which cutting is accomplished by chemical attack (HNO_3). It is useful in cutting single crystals for basic research. (M23)

325-M. Relationship of Distribution of Inclusions in Forged Steel to Macrographic and Micrographic Structure. (In French.) P. Cattier, Ch. Dubois, J. Bleton, and P. Bastien. *Revue de Metallurgie,* v. 47, Aug. 1950, p. 619-635; discussion, p. 635-636.

See abstract of "Distribution of Inclusions in Forged Steel", *Metal Treatment and Drop Forging,* items 182-M and 270-M, 1950.
(M27, M28, D5, AY)

326-M. Determination of Parameters of Beryllium by the Method of Partial Projection. (In Russian.) N. V. Belov and R. G. Matveeva. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, July 11, 1950, p. 299-302.

Bases of the method and its application to determination of crystallographic parameters of Be. The technique of computation using newly developed equations. Obtained data are compared with those determined by other methods. (M26, Be)

327-M. Electron-Microscopic Investigation of the Structure of Palladium Films, Produced on the Surfaces of Water Solutions of Metallic Salts by the Action of Gaseous Reducing Agents. (In Russian.) N. V. Demenev, N. N. Buinov, and M. I. Milyutina. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, Aug. 1, 1950, p. 751-754.

Results are compared with those previously obtained with thin films of Au and Pt. Hydrogen was used as the reducing agent and $PdCl_2$ as the salt. Influence of rate of reduction was particularly important. (M27, M21, Pd)

328-M. A Mechanical X-Ray Structure-Factor Calculating Machine. V. Vand. *Journal of Scientific Instruments,* v. 27, Oct. 1950, p. 257-261.

Machine capable of carrying out calculations for up to 24 atoms. (M23)

329-M. A Simple Machine Capable of Fourier Synthesis Calculation. J. H. Robertson. *Journal of Scientific Instruments,* v. 27, Oct. 1950, p. 276-278.

A machine for one-dimensional Fourier summation such as required in X-ray crystallography. (M22)

330-M. A Small High-Temperature High-Vacuum Furnace. K. B. Alberman. *Journal of Scientific Instruments,* v. 27, Oct. 1950, p. 280-282.

Suitable for heating gram quantities up to 2500° C. under pressures of 10^{-4} to 10^{-5} mm. Hg. (M23)

331-M. The Nature and Uses of Diffraction. A. E. W. Austen and N. Hendry. *Journal of the Electrodepositors' Technical Society,* v. 25, 1950, p. 105-123. (Preprint)

Applications to the identification of composition, structure, crystal size, state of random strain, orientation, and macroscopic strain. Reviews literature on electrodeposited layers, considering nature of the interface, adhesion of deposit, and strain in deposit. 18 ref. (M22, L17)

332-M. On the Phases Occurring in Alloys of Aluminium With Copper, Magnesium, Manganese, Iron, and Silicon. Gosta Phragmen. *Journal of the Institute of Metals,* v. 77, Aug. 1950, p. 489-552.

Studied by microscopic and X-ray crystallographic methods. Results are shown in diagrams for systems of three, four, five, or six components. Colors of the phases in ordinary and polarized light, their etching properties, crystal system, crystal form, unit-cell parameters and in some instances densities. Some information about two phases which do not form eutectics with Al. 67 ref.
(M26, Al, Cu, Mg, Mn, Fe, Si)

333-M. The Constitution of Uranium-Molybdenum Alloys. P. C. L. Pfeil. *Journal of the Institute of Metals,* v. 77, Aug. 1950, p. 553-570.

The system was examined using micrographic, X-ray, and thermal-analysis methods. No intermediate phases were recognized. Experimental results, particularly the solid solubility of Mo in the three allotropic modifications of U, are discussed in terms of the general theory of the alloying behavior of U. 10 ref. (M24, Mo, U)

334-M. The Uranium-Iron System. J. D. Grogan. *Journal of the Institute of Metals,* v. 77, Aug. 1950, p. 571-576.

An examination of the uranium end of the U-Fe system and a brief survey of the remainder. (M24, U, Fe)

335-M. An X-Ray Examination of Uranium-Iron Alloys, and a Discussion of the Structure of UFe_2. C. J. Birkett Clews. *Journal of the Institute of Metals,* v. 77, Aug. 1950, p. 577-580.

An appendix to the preceding paper by J. D. Grogan. (See above abstract, item 334-M.) A series of 10 U-Fe alloys was examined. The alloys contained 1-50 weight % Fe. (M26, U, Fe)

336-M. Lattice Parameters of Binary Nickel-Cobalt Alloys. A. Taylor. *Journal of the Institute of Metals,* v. 77, Aug. 1950, p. 585-594.

It was found that Co and Ni are mutually soluble in each other in all proportions. In general, increasing the Co content increases the lattice spacing of face-centered cubic Ni in a non-linear manner, producing an inflection in the spacing/composition curve in the region of Ni_7Co_3, and a second inflection near $NiCo_3$, beyond which point face-centered cubic and hexagonal close-packed forms coexist in randomly occurring ratios. Ni additions to Co within this anomalous region reduce both the *a* and *c* parameters of the hexagonal structure, while causing the mean atomic volume to fall at the same rate as for the cubic form. Transformation from cubic to hexagonal structure of equivalent composition involves a decrease of nearly 0.6% in atomic volume. 17 ref. (M26, Ni, Co)

337-M. Elektron Micrography. Jean Ternisien. *Microtecnic* (English Ed.), v. 4, Mar.-Apr. 1950, p. 82-88; May-June 1950, p. 137-142; July-Aug. 1950, p. 189-193. (Translated from the French.)

First installment. Fundamental principles and optics of electrostatic and magnetic lenses. Compares the two types. Second part: The instrument and its analogy with the optical microscope. Concluding section: Specimen-mounting procedures and several metallurgical applications. 57 ref. (M21)

338-M. Grain-Size Control in Steel. B. R. Nijhawan. *Transactions of the Indian Institute of Metals,* v. 1, Apr. 1949, p. 53-71.

Summarizes available information. Includes description of methods for determining austenite grain size. (M27, ST)

339-M. The Metallography of Commercial Alloys of the Duralumin Type. Anand S. Sharma. *Transactions of the Indian Institute of Metals,* v. 1, June 1948, p. 39-53; Apr. 1949, p. 11-44; v. 3, 1949, p. 279-307.

Part I: Methods of preparation of different Al alloys, also various aspects of heat treatment. Part II: The binary systems Al-Cu and the ternary systems Al-Cu-Mg, Al-Cu-Si, Al-Cu-Fe and Al-Cu-Mn. Part III: The quaternary systems Al-C-Fe-Mn, Al-Cu-Fe-Si, Al-Cu-Mn-Si, Al-Cu-Mg-Si, Al-Cu-Mg-Fe and Al-Cu-Mg-Mn. Each alloy was examined under the following conditions: chill cast; annealed at the solution temperature for 70 hr.; and solution treated at the same temperature and for the same length of time. Hardness measurements were made immediately after quenching from the solution temperature and at intervals during the progress of aging both at room temperature and at 160° C. Change of hardness was correlated with microstructure. 90 ref. (M24, J27, Al)

340-M. Beryllium Crystals. (In German.) Gustav Jaeger. *Zeitschrift für Metallkunde,* v. 41, Aug. 1950, p. 243-246.

The different crystal forms of Be deposited during the electrolytic decomposition of NaCl-BeCl melts. Debye-Scherrer patterns show that there is no difference in the crystal structures of laminar and acicular Be crystals. 13 ref. (M26, C21, Be)

341-M. Investigation of Metal Surfaces by the Lacquer-Imprint and the Phase-Contrast Processes. (In German.) W. Faasch, G. Hein, and L. Koch. *Metalloberfläche,* sec. A, v. 4, Sept. 1950, p. 129-135.

In many cases, the lacquer-imprint process with simple photo-optical illumination gives results superior to the customary methods of investigation. Comparative photomicrographs support the author's claims. (M23)

342-M. Metallography of Zirconium. H. P. Roth. *Metal Progress,* v. 58, Nov. 1950, p. 709-711.

The perchloric-acetic electrolytic method is shown to be superior to mechanical polishing and chemical etching for Zr and Zr-U alloys. (M21, Zr)

343-M. A New Anodic-Film Method for Studying Orientation in Aluminum. André Hone and E. C. Pearson. *Metal Progress,* v. 58, Nov. 1950, p. 713-715.

An earlier article (Mar. 1948, item 11-59, 1948) described a method of

surface preparation which revealed the orientation of grains in aluminum. Subsequent improvements are: An electrolyte and technique which give satisfactory results in a shorter time; the extended use of striations as an aid in observing changes in orientation; the application of the method for macro-etching; and its application for analysis of flow in plastic deformation and for the study of recrystallization. (M21, Al)

344-M. Phase Contrast Metallography. R. L. Seidenberg and J. R. Benford. *Metal Progress,* v. 58, Nov. 1950, p. 725-728.

A new technique for microscopic observation. Conventional metallographic microscopes may be converted to "phase microscopes" by addition of an annular stop in the illuminating system and a phase disk in the image of the stop. Comparative results. (M21)

345-M. Transfer of Replica From Metal to Electron Microscope. Harold C. O'Brien, Jr. *Metal Progress,* v. 58, Nov. 1950, p. 732.

Improved technique. (M21)

346-M. Galvanic Macro-Etch for High-Purity Aluminum. I. S. Servi. *Metal Progress,* v. 58, Nov. 1950, p. 732-733.

Recrystallized Al bars were dipped for about ¾ of their length into a 15% solution of HCl and externally coupled with an 18-8 stainless steel rod dipped into the same solution. After rinsing, the process was repeated after reversing the position of the bar. The galvanic action due to coupling with a more noble electrode increases the etching rate and gives a better contrast to the final structure. (M21, Al)

347-M. Thermal Polishing and Etching. A. G. Metcalfe and M. J. Olney. *Metal Progress,* v. 58, Nov. 1950, p. 733-734.

Discusses letter from Glen W. Wensch (Apr. issue, item 138-M), which describes phenomena observed on the surface of Ni specimens after long times of annealing in sealed evacuated tubes. Use of the technique to examine metals at elevated temperatures, using a reflecting microscope. (M21, Ni)

348-M. Electrolytic Polishing of Nickel. Glen W. Wensch. *Metal Progress,* v. 58, Nov. 1950, p. 735-736.

Modified bath composition and procedure. (M21, Ni)

349-M. A Note on the Orientated Overgrowths of Metal Films on Single Crystal Inorganic Substrates. H. R. Thirsk. *Proceedings of the Physical Society,* v. 63, sec. B, Nov. 1, 1950, p. 833-839.

Some new examples of metal crystal orientations on inorganic substrates. They include Ag and Fe on mica, Pt on the cube face of KCl, Fe and Ag on the (111) face of KCl, and Ag and Ni on the cube face of MgO. Some of the problems involved in the study of types of crystal growth. Includes diffraction patterns. 19 ref.
(M26, Ag, Fe, Pt, Ni)

350-M. Microradiographic Study of Grain Contours of Pure Aluminum and of an Aluminum-Zinc Solid Solution During the Beginning of the Melting Process. (In French.) Aurel Berghezan, Paul Lacombe, and Georges Chaudron. *Comptes Rendus* (France), v. 231, Sept. 18, 1950, p. 576-578.

Results of study, made by the method described by Trillat and Fournier in 1940. Four photomicrographs illustrate the results. During melting of the 12%-Zn Al alloy, Zn crystallizes out at the grain boundaries.
(M23, N12, Al, Zn)

351-M. X-Ray Fourier Synthesis of Chemical Bonds. (In German.) Clemens Peters. *Fortschritte der chemischen Forschung,* v. 1, no. 4, 1950, p. 613-641.

Methods of applying Fourier synthesis to analysis of X-ray patterns. Heteropolar or ionic bonds; homopolar or atomic bonds, the transition between heteropolar and homopolar bonding, metallic bonds in Mg and Al, van der Waals bonding and residual valences, and the hydrogen bond. 39 ref. (M22)

352-M. A Magnetostatic Electron "Shadow" Microscope as an Electron-Diffraction Apparatus. (In German.) Bodo v. Borries. *Kolloid Zeitschrift,* v. 118, Aug. 1950, p. 110-112.

Apparatus and typical results. (M21)

353-M. Etching of Metals and Minerals for Ultra-Violet Microscopy. (In Russian.) E. M. Brumberg, G. A. Zaitsov, and T. G. Porokhova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, Aug. 21, 1950, p. 1165-1168.

Technique, method of etching and preparation of specimens. Color plates illustrate results obtainable. (M21)

354-M. Solid Solutions in the System Cobalt-Arsenic (In Russian.) M. I. Kochnev. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, Aug. 21, 1950, p. 1197-1199.

The system was investigated by determination of ignition tempera-

tures of Co-As alloys (44-70% Co) when heated in an air stream. Analysis of the data indicate ranges of solid-solution formation for CoAs, Co_3As_2, Co_2As, and Co_5As_2. (M24, Co, As)

355-M. Value of Structural Analysis of Crystals in Contemporary Science. (In Russian.) J. D. Bernal. *Uspekhi Khimii* (Progress in Chemistry), v. 19, July-Aug. 1950, p. 401-418.

Reviews literature on application of structural analysis to organic, inorganic, and biochemistry; also metallurgy; latest trends in X-ray technique, and branches of technology requiring further study. 59 ref. (M26)

356-M. (Book) **Metallographie** (Metallography). Ed. 3. O. Mies. 68 pages. 1949. Springer Verlag, Berlin, Germany. (Werkstattbücher No. 64). 6s., 4d.

Brief data on the composition of alloys and their metallographic investigation. Divided into three main sections—first, the most important characteristics of iron and steel, their appearance under the microscope and their mechanical properties; second, conditions under which the most important types and forms of iron and steel structures are produced, and third, formation of structures and their properties. (M general, Fe, ST, TS)

357-M. (Book) **X-Ray Crystallography.** Ed. 4. R. W. James. 88 pages. 1950. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. $1.25.

A brief outline of principles underlying the methods of X-ray crystal analysis. Designed to be of interest to students of other branches of physics, and at the same time capable of serving as an introduction to the subject of crystallography. (M22, M26)

358-M. Tearline Patterns in Ferrochromium. C. A. Zapffe and F. K. Landgraf. *Journal of Applied Physics,* v. 21, Nov. 1950, p. 1197-1198.

The problem of distinguishing between Type I and II fracture patterns in interpretation of fractographs. Several complex examples of 70% Cr ferrochromium. Correct identification often has important implications for theories of the solid state. (M23, Fe-n, Cr)

359-M. The Iron—Iron Phosphide—Copper Phosphide—Copper System. (In German.) Rudolf Vogel and Josef Berak. *Archiv für das Eisenhüttenwesen,* v. 21, Sept.-Oct. 1950, p. 327-336.

The constitution diagram was completely established by thermal and microscopic methods. Results confirm the fact that iron has a greater affinity for P than for Cu. (M24, Fe, Cu)

360-M. Electron-Microscope Structure Studies of Laminar Pearlite and of Pearlite in a Chromium Magnet Steel. (In German.) Angelica Schrader. *Archiv für das Eisenhüttenwesen,* v. 21, Sept.-Oct. 1950, p. 337-343.

Results indicate the possibility that the carbide grains of coarse laminar or coarse granular pearlite are only very slightly attacked by the etchant, whereas the carbide in fine pearlite is more severely attacked. This may explain why the electron microscope reveals coarse pearlite more distinctly than the fine form. Study of the above steel shows also that the replica process reveals considerably more structural detail than do photomicrographs. (M21, AY, SG-n)

361-M. Discussion—Institute of Metals Division; New York Meeting, February 1950. *Journal of Metals,* v. 188, Nov. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1353-1381.

Covers the following papers: "The Iron-Nitrogen System", V. G. Paranjpe, M. Cohen, M. B. Bever, and C. F. Floe (Feb. 1950); "The System Chromium-Carbon", D. S. Bloom and N. J. Grant (Jan. 1950); "Carbides in Isothermally Transformed Chromium Steels", W. Crafts and J. L. Lamont (Dec. 1949); "Carbides in Long-Tempered Vanadium Steels", W. Crafts and J. L. Lamont (Mar. 1950); "A Study of the Iron-Chromium-Nickel Ternary System", J. W. Pugh and J. D. Nisbet (Feb. 1950); "Faults in the Structure of Copper-Silicon Alloys", C. S. Barrett (Jan. 1950); "Undercooling of Minor Liquid Phases in Binary Alloys", C. C. Wang and C. S. Smith (Jan. 1950); "Measurement of Relative Interface Energies in Twin Related Crystals", C. G. Dunn, F. W. Daniels, and M. J. Bolton (Feb. 1950); "Titanium Binary Alloys", C. M. Craighead, O. W. Simmons, and L. W. Eastwood (Mar. 1950); "Some Observations on the Recovery of Cold Worked Aluminum", T. V. Cherian, P. Pietrokowsky, and J. E. Dorn (Dec. 1949); "Effect of Prestraining Temperatures on the Recovery of Cold Worked Aluminum", T. E. Tietz, R. A. Anderson, and J. E. Dorn (Dec. 1949); "The Properties of Sand Cast Magnesium-Rare Earth Alloys", T. E. Leontis (Dec. 1949); "Some Effects of Phosphorus and Nitrogen on the Properties of Low Carbon Steel", G. H. Enzian (Feb. 1950); "Intergranular Parting of Brass During Anneals", F. H. Wilson and E. W. Palmer (Dec.

1949); "Effect of Solute Elements on the Tensile Deformation of Copper", R. S. French and W. R. Hibbard, Jr. (Jan. 1950); "Electrical Resistivity and Thermoelectric Power of Antimony-Selenium Alloys", B. D. Cullity, M. Telkes, and J. T. Norton (Jan. 1950); "Effects of Three Interstitial Solutes (Oxygen, Nitrogen, and Carbon) on the Mechanical Properties of High-Purity, Alpha Titanium", W. L. Finlay and J. A. Snyder (Feb. 1950); "A Preliminary Investigation of the Zirconium-Beryllium System by Powder Metallurgy Methods", H. H. Hausner and H. S. Kalish (Jan. 1950); "Cemented Titanium Carbide", J. C. Redmond and E. N. Smith (Dec. 1949); "The Elastic Coefficients of Single Crystals of Alpha Brass", R. W. Fenn, Jr., W. R. Hibbard, Jr., and H. A. Lepper, Jr. (Jan. 1950); "Behavior of Pores During the Sintering of Copper Compacts, F. N. Rhines, C. E. Birchenall, and L. A. Hughes (Feb. 1950); "Self-Diffusion in Alpha and Gamma Iron", C. E. Birchenall and R. F. Mehl (Jan. 1950); "Diffusion Coefficient of Carbon in Austenite", C. Wells, W. Batz, and R. F. Mehl (Mar. 1950); and "The Growth of Austenite as Related to Prior Structure", A. E. Nehrenberg (Jan. 1950). (M general, N general, P general, Q general)

362-M. Sigma Phase in Stainless: What, When, and Why. George V. Smith. *Iron Age,* v. 166, Nov. 30, 1950, p. 63-68; Dec. 7, 1950, p. 127-132.

Attempts to correlate and clarify present confusion concerning occurrence and identification, mode of formation, possible existence of more than one kind of sigma, and desirability or undesirability of its presence. Includes phase diagrams and photomicrographs. Part II: Effect on mechanical properties and corrosion resistance. How this phase can be converted into harmless delta ferrite by heat treatment; however, this restoration method may produce grain growth. 17 ref. (M26, N8, Q general, R general, SS)

363-M. Preparation of Samples for Metallographic Examination. G. W. Graves. *Foundry,* v. 78, Dec. 1950, p. 163-164. Reprinted from *Burrell Announcer,* No. 50-10-40 (Burrell Corp., Pittsburgh).

Condensed description of recommended procedures. (M21)

364-M. Preparation, Structure, and Applications of Thin Films of Silicon Monoxide and Titanium Dioxide. Georg Hass. *Journal of the American Ceramic Society,* v. 33, Dec. 1, 1950, p. 353-360.

Vacuum-deposited thin films of SiO decompose to Si and SiO_2 when heat treated in an inert atmosphere, and oxidize in SiO_2 when heated in air. Their oxidation rates in air at various temperatures were measured by optical means. SiO is especially suitable for depositing protective layers on first-surface mirrors and for preparing replica and support films for electron-microscope and electron-diffraction studies. TiO_2 films prepared by evaporating Ti and oxidizing it in air at 400-500° C. have a rutile structure. Such rutile films can be used for splitting beams and for increasing the reflectivity of first-surface mirrors. 23 ref. (M23, R2)

365-M. An Equipment for the Microscopic Examination of Metals and Crystals in Polarized Light at Temperatures From −130 to +35° C. J. C. Monier and R. J. Hocart. *Journal of Scientific Instruments,* v. 27, Nov. 1950, p. 302.

Includes diagram. (M21)

366-M. Multiple-Film Back-Reflection Camera for Atomic Strain Studies. Anthony B. Marmo. *National Advisory Committee for Aeronautics,* Technical Note 2224, Nov. 1950, 22 pages.

New X-ray diffraction technique, which eliminates some of the principal limitations and reduces others imposed by conventional single-film back-reflection methods. Comparative analysis of the results indicated that a more detailed analysis of atomic strain could be obtained by the new method. (M22)

367-M. Lattice Parameters of Magnesium Alloys. Robert S. Busk. *Journal of Metals,* v. 188, Dec. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1460-1464.

The effect of solute additions. Empirical equations derived from the data permit calculation of the lattice parameters of ternary solid solutions from binary data. 14 ref. (M26, Mg)

368-M. Lattice Parameters of Martensite and of Austenite. Jozef Mazur. *Nature,* v. 166, Nov. 11, 1950, p. 828.

Lattice parameters established for steels containing 1.25, 1.20, 0.90, 0.89, 0.75, and 0.45% C. Methods were described in previous communications. (M26, CN)

369-M. Structure of Cobalt Disilicide. (In French.) Felix Bertaut and

Pierre Blum. *Comptes Rendus* (France), v. 231, Sept. 25, 1950, p. 626-628.

The Co-Si system was studied by electrodeposition of Si on Co. Phases which appeared successively were Co_2Si, CoSi, and $CoSi_2$, the latter previously unreported. Existence of $CoSi_2$ was verified by direct synthesis by fusion of Co and 2Si. Interpretation of Debye-Scherrer diagrams gave information on crystal structure and unit-cell dimensions. (M26, Co, Si)

370-M. Application of Electron Diffraction to the Study of Alloy Single Crystals. (In French.) Heinz Raether. *Comptes Rendus* (France), v. 231, Oct. 2, 1950, p. 653-655.

Technique for the above, including method of preparation of the single crystals. Results of a typical investigation of $AgCu_3$. (M21, M26)

371-M. The Crystal Structure of $PtSn_4$. (In German.) Konrad Schubert and Ulrich Rösler. *Zeitschrift für Metallkunde,* v. 41, Sept. 1950, p. 298-300.

See abstract from *Zeitschrift für Naturforschung* item 145-M, 1950. (M26, Pt, Sn)

372-M. Definition of Microstructure With the Aid of Structure Series. (In German.) Franz Roll. *Metall,* v. 4, Nov. 1950, p. 463-466.

Structure series based on grain size, segregation, phases, etc., are a valuable aid in evaluation of the microstructures of metals and alloys. Photomicrographs and a table illustrate application of the concept. (M27)

373-M. Developments in Laboratory Methods and Apparatus. H. J. Axon and K. M. Entwistle. *Metallurgia,* v. 42, Nov. 1950, p. 349-352.

Reviews developments of past 21 years in methods and apparatus for laboratory examination of metals and alloys. Includes structural investigation, analysis, physical, and mechanical testing. (M21, M22, M23, S11, P general, Q general)

374-M. Joint Discussion on the Papers—"Further X-Ray Study of the Equilibrium Diagram of the Fe-Ni System", by E. A. Owen and Y. H. Liu; **"Free-Energy and Metastable States in the Fe-Ni and Fe-Mn Systems",** by F. W. Jones and W. I. Pumphrey; **"Microscopical Studies on the Iron-Nickel-Aluminium System. Part I. $\alpha + \beta$ Alloys and Isothermal Sections of the Phase Equilibrium Diagram",** by A. J. Bradley; and **"Constitution of Iron-Nickel-Chromium Alloys at 650° to 800° C.",** by W. P. Rees, B. D. Burns, and A. J. Cook. *Journal of the Iron and Steel Institute,* v. 166, Nov. 1950, p. 200-212.

Above papers were published in the Oct., Sept., and July 1949 issue, respectively. Includes authors' replies. (M24, P12, Fe, Ni, Mn, Al, Cr)

375-M. Electron-Microscopic Studies of Metallic Structures by Means of the Replica Method. (In Swedish.) M. Hillert and S. Modin. *Jernkontorets Annaler,* v. 134, no. 9, 1950, p. 495-514.

A general survey supplemented by the authors' experiences. Attempts to use polystyrene-aluminum replicas were not very successful. Experiments with Formvar replicas were successful. The limit of resolution seemed to lie at about 300Å. A eutectic carbon steel was investigated after different heat treatments. Pearlitic and bainitic structures obtained are described. 14 ref. (M21)

SECTION N

TRANSFORMATIONS and RESULTING STRUCTURES

1N. The Influence of Atomic Order on Magnetic Properties. J. E. Goldman. *Journal of Applied Physics,* v. 20, Dec. 1949, p. 1131-1136.

Reviews recent data on effect on magnetic properties of the order-disorder transformation. Extends recently developed theory of the influence of order on the saturation moment to cases such as Ni_3Mn and the Heusler alloy. Presents a new approach in interpreting structure-sensitive magnetic properties, notably permeability and coercive force, based on some of the consequences of order-disorder transformations. 21 ref. (N10, P16)

2N. Fundamentals of the Working of Metals. Part VI. Effects of Phase Changes on Forming. George Sachs. *Modern Industrial Press,* v. 11, Dec. 1949, p. 6, 8, 10, 48.

Examples of precipitations and their effect; eutectoid transformations of steels; phase changes and fibering; phase changes in Fe-Ni-Cr alloys. (N general)

3N. Cooling of Black-Heart Malleable Iron. J. E. Rehder. *Canadian Metals and Metallurgical Industries,* v. 12, Dec. 1949, p. 20-23, 29.

See abstract of "Influence of Silicon Content on Critical Temperature Range During Slow Cooling of Black-Heart Malleable Iron", *American Foundrymen's Society,* Preprint; item 18B-75, 1949. (N8, J23, CI)

4N. Overheating Phenomena in Aluminium-Copper-Magnesium-Silicon Alloys of the Duralumin Type. J. Crowther. *Journal of the Institute of Metals,* v. 76, Nov. 1949, p. 201-236.

The incidence of quench-cracking in components made from the above sheet to an aircraft specification led to an examination of the dependence on chemical composition of the effective solidus temperature of alloys of this general type. A series of experimental alloys covering a wide range of Si and Mg contents was investigated. The Al corner of the quaternary Al-Cu-Mg-Si system was examined at 4% Cu content, and the solidus was found to correspond closely with that of the more complex alloys. 23 ref. (N12, M24, Al)

5N. Undercooling of Minor Liquid Phases in Binary Alloys. Chih-Chung Wang and Cyril Stanley Smith. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Jan. 1950, p. 136-138.

Tin in an Al-Sn alloy containing 10% Sn solidifies over a temperature range as high as 100° C. The tin is partly distributed in isolated droplets and the amount of undercooling depends on the chance presence of nuclei effective at various temperatures in drops of varying sizes. Heat treatment affects the size distribution and modifies the cooling curve. Similar behavior is to be expected in any alloy where the liquid is physically discontinuous and where solidification is not nucleated by a previously solidified constituent. (N12, Al, Sn)

6N. Aging Behavior of a Zinc Alloy Containing 25% Manganese, 15% Copper, 0.1% Aluminum. P. W. Ramsey and G. L. Werley. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Jan. 1950, p. 139-143.

Aging changes in an experimental die casting alloy from 60 to 185° C. The exponential increase of aging rate with temperature is used in predicting lower-temperature behavior, and an analogy between aging and diffusion behavior is noted. Q values derived from aging-rate curves show some agreement. (N7, Zn)

7N. Self-Diffusion in Alpha and Gamma Iron. C. E. Birchenall and R. F. Mehl. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Jan. 1950, p. 144-149.

Self-diffusion coefficients were measured from 720 to 1357° C. Approximate exponential laws for their behavior. (N1, Fe)

8N. The Effects of Nitrogen, Iron, or Nickel Upon the Alpha-Beta Transformation and Gamma Precipitation in Cobalt-Chromium Alloys. A. R. Elsea and C. C. McBride. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Jan. 1950, p. 154-161.

A metallographic investigation of the transformation and precipitation reactions occurring in the Co-rich region. All the above additions lower the α-β-transformation temperature range and tend to promote formation of γ-phase. (N7, Co)

9N. The Growth of Austenite as Related to Prior Structure. A. E. Nehrenberg. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Jan. 1950, p. 162-174.

New austenite is restricted in growth by grain boundaries in the prior structure. It is equiaxed when the prior structure is the result of a high-temperature transformation, and is acicular in shape when the initial structure is bainite or martensite. 35 ref. (N8)

10N. Report on Graphitization Studies on High-Temperature Welded Piping of the Philadelphia Electric Company. J. B. Abele and A. E. White. *Transactions of the American Society of Mechanical Engineers,* v. 72, Jan. 1950, p. 37-46; discussion, p. 46-52.

Previously abstracted from *American Society of Mechanical Engineers,* Paper No. 48-A-94, 1948. See item 18B-54, 1949. (N8, K general)

11N. The Role of Crystal Boundaries in Anomalies of Propagation of Ultrasonics in Metals. (In French.) Jacques Bleton, Paul Bastien, and Emmanuel de Kerversau. *Comptes Rendus* (France), v. 229, Nov. 14, 1949, p. 1016-1018.

Results of experimental and theoretical investigation. (N26)

12N. Study of Recrystallization of Pure Aluminum by Means of Isochronal and Isothermal Annealing. (In French.) H. Chossat, P. Lacombe, and G. Chaudron. *Revue de Métallurgie,* v. 46, Oct. 1949, p. 676-681.

Results indicate individual spheres of application of the two types of annealing. Isochronal annealing is particularly suited to demonstration of the influence of impurities on rate of recrystallization. Isothermal treatment at a sufficiently low temperature permits separation on a time scale of the processes of restoration and recrystallization. 10 ref. (N5, J23, Al)

13N. Graphitization of Pretempered White Cast Iron. (In French.) P. Laureat and M. Ferry. *Revue de Métallurgie,* v. 46, Oct. 1949, p. 695-698.

Results of comprehensive study indicate that initial formation of graphite takes place, not in the eutectic cementite, but in the cementite of the sorbite. Thus, to obtain rapid graphitization, it is necessary to have a sorbitic structure. (N8, CI)

14N. The Martensite Transformation. (In Czech.) Vojtecha Jarese. *Hutnické Listy,* v. 4, Oct. 1949, p. 309-316.

Reviews present knowledge and methods for determination of the M point. Gives particular attention to a method using the unnotched impact test. A small specimen is broken at the quenching temperature. At the M point there is a sudden decrease in toughness with decreasing temperatures. (N8)

15N. Contribution to the Theory of Segregation. (In German.) H. Klemm. *Archiv für Metallkunde,* v. 3, Nov. 1949, p. 376-380.

Attempts to explain segregation processes, especially from the unstable state, on the basis of precipitation theory. Distinguishes between the cooling segregate and the annealing segregate. Processes are expressed in the form of formulas. 14 ref. (N7)

16N. Changes in Volume During Formation of Solid Solutions of Metallic Alloys. (In Russian.) N. Kh. Abrikosov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 68, Sept. 21, 1949, p. 511-514.

The problem was studied using solid solutions of Cu, Ag, and Au with metals of the 4th and 5th groups of the periodic system. Method of investigation and data for each investigated alloy. 26 ref. (N12)

17N. Study of Transformation in the α-Solid Solution in the System Fe-Cr by a Rate-of-Transformation Method. (In Russian.) I. I. Kornilov and V. S. Mikheav. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 68, Sept. 21, 1949, p. 527-530.

Use of newly developed technique to determine the complex character of the above transformation. Maximum rate was found for alloys containing 42.44, 46.44, and 49.5% Cr. Indicates formation of β and θ phases, as well as the previously known σ phase. (N8, Fe, Cr)

18N. Rates of Processes in the Thermochemical Treatment of Steel. (In Russian.) M. M. Zamyatin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 68, Sept. 21, 1949, p. 545-548.

Apparently refers to such processes as chromizing, nitriding, etc., where diffusion is an important factor. Theoretical analysis. Equations are graphically interpreted for different values of the variables. (N1, L15, J28, ST)

19N. Causes of the Influence of Molybdenum on Kinetics of Isothermal Decomposition of Austenite. (In Russian.) B. Yu. Mett and P. I. Entin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 68, Oct. 1, 1949, p. 681-684.

Investigated for low-alloy steel (0.68% C, 0.24% Si, 0.49% Mn, and 0.65% Mo) by determining the structure of the carbide phase in the initial phase of austenite decomposition. In steel containing about 7% Mo, the beginning of the process is connected, in the temperature range of the pearlite transformation, with formation of a molybdenum carbide. On the contrary, below 5% the decomposition is not connected with diffusion of Mo; therefore, the latter does not have any important influence on the rate of decomposition. (N8, AY)

20N. Influence of Size and Shape of Parts or Test Specimens on Depth and Composition of Layers Resulting from Thermochemical Treatment of Steel. (In Russian.) M. M. Zamyatin. *Dokludy Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 68, Oct. 1, 1949, p. 725-728.

Apparently refers to such processes as chromizing or nitriding. Theoretical analysis of the effects of above factors, also of time, temperature, and composition. (N1, L15, J28, ST)

21N. The Problem of Spontaneous Formation of Nuclei of a New Phase. (In Russian.) O. S. Ivanov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 68, Oct. 1, 1949, p. 729-732.

Proposes an improved formula for determination of the rate of nuclei formation, with particular reference to phase transformation in substances such as metals and alloys. (N2)

22N. Calculation of the Rate of Solidification of Metallic Bodies. (In Russian.) B. Ya. Lyubov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., Oct. 11, 1949, p. 847-850.

A mathematical analysis. (N12)

23N. Concerning Anomalous Effects in X-Ray Diffraction Patterns of Aging Polycrystalline Alloys. (In Russian.) A. M. Elistratov, S. D. Finkel'shtein, and A. I. Pashilov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., Oct. 21, 1949, p. 1017-1020.

Several coarse-grained polycrystalline alloys subject to aging were studied; namely, several Al alloys and beryllium bronze. X-ray diffraction patterns of such alloys are very sensitive to structural changes accompanying aging. Possibility of explaining the mechanism of aging by study of these patterns. (N7, M22, Al, Cu)

24N. Electron Microscope Study of Aging of Aluminum-Magnesium-Silicon Alloys. (In French.) Raymond Castaing and André Guinier. *Comptes Rendus* (France), v. 229, Nov. 28, 1949, p. 1146-1148.

Study of three main types of aging: below 200° C., between 200 and 250° C., and at higher temperatures. Confirms the linear character of structural changes in the initial stage. (N7, M22, Al)

25N. Concerning Changes in Grain Size of Steel as a Result of Its Recrystallization. (In Russian.) V. I. Arkharov and Yu. D. Kozmanov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 69, Nov. 1, 1949, p. 33-35.

Volumetric changes taking place upon heating above 1000° C. result in a transition state prior to recrystallization called "transcrystallization" characterized by overlapping of the crystallites. The distortion of the crystal lattice caused by this transition step is followed by recrystallization of the product of the phase transformation. Depending on the degree of crystallite overlapping, which varies with composition, rate of "transcrystallization", and conditions of subsequent heat treatment, the second step—recrystallization—may result in quite wide differences in final grain size. (N5, ST)

26-N. Growing and Processing of Single Crystals of Magnetic Metals. J. G. Walker, H. J. Williams, and R. M. Bozorth. *Review of Scientific Instruments,* v. 20, Dec. 1949, p. 947-950.

Apparatus and procedure by which single crystals of Ni, Co, and various alloys are grown by slow cooling of the melt. Technique of orientation and grinding. (N12, SG-n)

27-N. Preparation of Single Crystal Copper Ribbons From Single Crystal Copper Rods. A. A. Petrauskas, E. A. Coomes, and J. E. MacDonald. *Review of Scientific Instruments,* v. 20, Dec. 1949, p. 961-962.

Technique developed in connection with work on electronic emission from single crystal surfaces. (N12, Cu)

28-N. A Technique for Cutting Metal Single Crystals. T. R. McGuire and Robert T. Webber. *Review of Scientific Instruments,* v. 20, Dec. 1949, p. 962-963.

Apparatus and technique in which the cutting action is due to suitable etching agent carried on a Fiberglas thread. (N12)

29-N. Rate of Self-Diffusion in Tin Crystals. W. Boas and P. J. Fensham. *Nature,* v. 164, Dec. 31, 1949, p. 1127-1128.

An explanation of the anisotropy in terms of the mechanism of diffusion does not yet seem possible. (N1, Sn)

30-N. Relief of Internal Stresses by Precipitation. L. M. Clarebrough. *Nature,* v. 165, Jan. 7, 1950, p. 39.

During an investigation of recrystallization of two-phase Ag-Mg alloys, it was observed that precipitation occurring in one of the phases, after deformation but before recrystallization, increases the temperature at which recrystallization starts in that phase. Experimental work was done on an Ag alloy containing 9.5% Mg. Includes back-reflection X-ray diagram and photomicrographs. Explains the effect in terms of dislocation theory. (N7, Ag)

31-N. The Breakdown of Austenite Below the M_s Temperature. F. C. Thompson and M. D. Jepson. *Journal of the Iron and Steel Institute,* v. 164, Jan. 1950, p. 27-35.

Shows no reason to doubt that austenite in a plain carbon eutectoid steel can decompose isothermally below the M_s temperature. Decomposition during the actual quenching operation and that due to isothermal transformation should be considered independently. Dilatometric investigations show that isothermal decomposition becomes progressively slower as the temperature is lowered, and that there is no sign of a knee in the curve. Nature of the transformation product. Maximum rate of breakdown may be related to temperature by an exponential equation. 14 ref. (N8)

32-N. The Overheating and Burning of Steel. Part III. The Influence of Excessive Reheating Temperatures on the Mechanical Properties and the Structure of Alloy Steels. A. Preece, J. Nutting, and A. Hartley. *Journal of the Iron and Steel Institute,* v. 164, Jan. 1950, p. 37-45.

Mechanical tests were used to follow changes induced in a range of alloy steels after treatment at temperatures up to 1425° C. Influence of cooling rate on development of the overheated condition. Statistical examination of the effect of steel composition indicates that carbon and sulfur are important constituents, but that the influence of oxygen is doubtful. A number of related problems, such as austenite grain growth and influence of overheating on isothermal decomposition of austenite were also investigated. (N8, Q general, AY)

33-N. Grain-Boundary Phenomena in Severely Heated Steel. T. Ko and D. Hanson. *Journal of the Iron and Steel Institute,* v. 164, Jan. 1950, p. 51-62.

Structure and tensile properties of carbon steels quench-hardened after being heated to very high temperatures in the austenitic range were studied. A new metallographic method of studying overheating was used. The theory is proposed that overheating is due to partial precipitation on the austenite grain boundaries, at high temperatures, of sulfide brought into solution during heating. 17 ref. (N8, CN)

34-N. Structures of the Au_3Zn Phase in the Absence and in the Presence of Copper, Silver, and Cadmium. (In German.) Ernst Raub, Paul Walter, and Annemarie Engel. *Zeitschrift für Metallkunde,* v. 40, Nov. 1949, p. 401-405.

Results of X-ray studies of the alloy subjected to different heat treatments. Effects of Cu, Ag, and Cd on phase transformation were determined. (N9, Au)

35-N. Classification of Solubility of Elements in Iron. IV. Restricted Austenite Solid Solutions of Iron. (In Russian.) I. I. Kornilov. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR) (Section of Chemical Sciences), Sept.-Oct. 1949, p. 449-459.

On the basis of the relationship of

atomic diameters of various elements and iron, the group of elements forming the modification of a restricted austenite solid solution with Fe is isolated. A system of ternary, quaternary, and more complex solid solutions is presented on this basis. The maximum number of possible systems is calculated. 10 ref. (N8, Fe)

36-N. Kinetics of the Eutectoid Transformation in Alloys of Iron and Nitrogen. B. N. Bose and M. F. Hawkes. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Feb. 1950, p. 307-316.

Metallographic, X-ray diffraction, and microhardness studies on an alloy of 2.35% N_2, balance Fe. This alloy is analogous to the eutectoid Fe-C alloy with respect to transformation to "pearlitic" and "martensitic" structures. Isothermal transformation at all temperatures is slower in the nitrogen alloy, and the austenite is far more stable with respect to transformation to martensite. 21 ref. (N8, Fe)

37-N. Interference of Growing Spherical Precipitate Particles. C. Wert and C. Zener. *Journal of Applied Physics,* v. 21, Jan. 1950, p. 5-8.

The exact theory of the rate of growth was previously developed for the initial stage where the individual precipitate particles do not interfere with one another. This theory is carried one stage further to include their mutual interference. Applicability of the theory was tested by observations on the precipitation of carbon from α-iron. (N7, Fe)

38-N. Particle Size of Evaporated Gold. P. G. Wilkinson and L. S. Birks. *Journal of Applied Physics,* v. 21, Jan. 1950, p. 60.

Shows that tungsten-free gold deposits in the form of discrete particles. (N15, Au)

39-N. Dependence of the Structure of the Condensate on the Number of Nuclei. (In German.) E. Traub. *Zeitschrift für angewandte Physik,* v. 1, Dec. 1949, p. 545-549.

Effect of "precondensation" on the structures of thin metal films vapor deposited on paper tape was investigated. The process described permits close control of the variables, such as rate of deposition, temperature, and vapor pressure. (N15)

40-N. Carbon-Beryllium Steels. *Metal Progress,* v. 57, Feb. 1950, p. 254-257. Condensed from paper by W. Aichholzer, *Berg- und Hüttenmännische Monatshefte,* v. 93, June 1948, p. 100-114.

Influence of Be on five different carbon steels was studied with respect to transformation temperatures, temperability, and resistance to scaling. (N8, R2, AY)

41-N. Strain Induced Grain Boundary Migration in High Purity Aluminum. Paul A. Beck and Philip R. Sperry. *Journal of Applied Physics,* v. 21, Feb. 1950, p. 150-152.

Method which allows positive determination of the direction of grain-boundary movements. Mechanism for migration based on use of the method. Most of the strain-free grains formed during annealing of high-purity Al cold rolled up to about 40% are produced by this mechanism without formation of new nuclei. (N3, Al)

42-N. Kinetics of Heterogeneous Nucleation. D. Turnbull. *Journal of Chemical Physics,* v. 18, Feb. 1950, p. 198-203.

A theory for the effect of thermal history upon the kinetics of phase transformations is proposed. The kinetics of heterogeneous nucleation in the absence of retained embryos. 18 ref. (N2)

43-N. Grain Boundary Diffusion of Molten Bismuth in Copper. (In German.) *Zeitschrift für Naturforschung,* v. 4a, Oct. 1949, p. 524-526.

Microscopically investigated. It was found that depth of penetration is a linear function of time, and that log of penetration rate is proportional to the reciprocal of absolute temperature. Above 700° C., copper oxide is reduced by the Bi. (N1, Bi, Cu)

44-N. Rapid Transformations in Aluminum Solid Solutions. (In German.) Hermann Auer. *Zeitschrift für Naturforschung,* v. 4a, Oct. 1949, p. 533-540.

Age-hardening processes are explained as the result of atomic rearrangement in the crystal lattice. Effects of solution heat treatments and of extremely rapid heating show that rate of heating materially affects the structure of the metal, as shown by hardness and magnetic susceptibility curves. 20 ref. (N7, Al)

45-N. Effect of Bainite Structure on the Mechanical Properties of a Heat Resistant Heat-Treated Cr-Mo Steel. (In German.) U. Wyss. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 15, Dec. 1949, p. 365-374.

See abstract of condensed version from *Metal Progress* (item 4B-60, 1949), and original in *Von Roll Mitteilungen,* (4B-48, 1949). (N8, Q general, AY)

46-N. Age Hardening of Metals. G. C. Smith. "Progress in Metal Physics" (Interscience Publishers, New York), v. 1, 1949, p. 163-234.

Theory of the above process, tracing its development since the earliest work. 63 ref. (N7)

47-N. Hardening Response of Steels. E. H. Bucknall and W. Steven. "Progress in Metal Physics" (Interscience Publishers, New York), v. 1, 1949, p. 235-280.

Reviews recent investigations of hardening depth and transformation mechanism of carbon and alloy steels. Effects on mechanical properties. 95 ref.
(N8, Q general, CN, AY)

48-N. Preferred Orientation in Non-Ferrous Metals. T. Ll. Richards. "Progress in Metal Physics" (Interscience Publishers, New York), v. 1, 1949, p. 281-305.

General discussion of orientation of crystals with special attention to the influence of cold rolling and annealing on the structure and properties of copper and brass strip. 37 ref. (N5, Cu)

49-N. Diffusion of Metals in Metals. A. D. Le Claire. "Progress in Metal Physics" (Interscience Publishers, New York), v. 1, 1949, p. 306-379.

A phenomenological theory in terms of which diffusion coefficient measurements should be made. Experimental methods used, important results and conclusions drawn from them. 132 ref. (N1)

50-N. Investigations Into Corrosion Resisting Cast Chromium-Nickel Steel With Special Reference to the Sigma Phase. *Metallurgia*, v. 41, Jan. 1950, p. 163-164. From *Sulzer Technical Rev.*, 1949, no. 2, p. 1-8.

Influence of heat treatment on the formation of sigma phase for Type 20-14-4 (AISI 317). (N8, SS)

51-N. Decarburized Structures of White Cast Irons. (In Japanese.) Tokuhiko Mochida. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, May 1949, p. 24-26.

Cast irons containing 2.5 to 4.7% C were decarburized with H_2 at 750-850° C. Photomicrographs show structures obtained. (N8, CI)

52-N. Concerning the Mechanism of Formation of "Lower Bainite" and Troostite in Steels. (In Japanese.) Zenji Nishiyama and Michiyasu Doil. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, July 1949, p. 3-8.

Theoretical discussion. (N8, ST)

53-N. Graphitization of White Cast Iron. (In Japanese.) Kyuya Nagasaki. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, July 1949, p. 15-18.

Theoretical explanation based on the assumption that the process consists of diffusion of carbon in the matrix iron from cementite to graphite and that an Fe-graphite alloy is present. (N8, CI)

54-N. Concerning Superlattice Structures in the Mg-Cd System. (In Japanese.) **I.** Seizo Nagasaki, Makoto Hirabayashi, and Hideo Nagasi. **II.** Makoto Hirabayashi, Seizo Nagasaki, Hideyo Maniwa, and Hideo Nagasu. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, June 1949, p. 1-10.

Part I: Some physical properties of superlattices corresponding to Mg_3Cd, MgCd, and $MgCd_3$ and their relationships to the order-disorder transformation and temperature. Part II: A general review of the system based on study of about 40 specimens of various compositions. 16 ref. (N10, Mg, Cd)

55-N. Absorption of Gases by Metals. (In Japanese.) Shoichi Matsuda. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, June 1949, p. 10-14.

Statistical mechanical treatment of the problem assuming that the amount of gas absorption depends on the geometrical arrangement of the gas particles in the metal. The method of superlattice formation in binary alloys is applied to the problem. An experiment on activated absorption of O_2 by Ag suggests the validity of the arguments.
(N15, N10)

56-N. Formation of Columnar Austenite Grains by Carburization of α-Iron. (In Japanese.) Tokuhiko Mochida. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, June 1949, p. 34-35.

Results of laboratory investigation. Includes diagram of apparatus and photomicrographs. (N8, Fe)

57-N. Influence of Carbon and Silicon on the Graphitization of White Cast Iron. (In Japanese.) Tokuhiko Mochida. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, June 1949, p. 36-38.
(N8, CI)

58-N. The Ar_1 Transformation. I-II. (In Japanese.) Kyuya Nagasaki. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Aug. 1949, p. 1-7.

The initial temperatures of precipitation of α-phase or Fe_3C from

austenite are shown to be represented by "supersolubility" curves G_oS_o and E_oS_o, respectively, and not by solubility curves. The idea of supersolubility curves is applied to explain the mechanism of the above transformation. Part II: Austempering mechanisms and their structures. 10 ref. (N8, Fe)

59-N. Residual Stress Restored in Carburized and Decarburized Steels Slowly Cooled and Quenched. VI. Residual Stress Measurement. (In Japanese.) Tadao Sano. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Aug. 1949, p. 21-25.

Some residual-stress vs. depth curves of heat treated steels are smooth while others show minima. The latter are attributed to the unequal temperature of the Ar_1, Ar' or Ar" transformation in the specimen when its dimensions are large, or when its composition is not uniform because of decarburization or carburization. (N8, Q25, ST)

60-N. The Rate of Diffusion of Oxygen Through Silver on Silver-Plated Copper Wires. (In German.) Karl Hauffe. *Zeitschrift für anorganische Chemie*, v. 257, Dec. 1948, p. 279-288.

Studied at 700 and 610° C. and at an oxygen pressure of 1 atm. Results are compared with those obtained by other investigators. 15 ref. (N1, Ag, Cu)

61-N. Studies on the Structure of Hard Chromium Plate. Cloyd A. Snavely and Charles L. Faust. *Journal of the Electrochemical Society*, v. 97, Mar. 1950, p. 99-108.

Structural changes which take place during annealing of Cr plate, illustrated by photomicrographs. Recrystallization can be effected between 300 and 500° F. Loss of hardness is concurrent with recrystallization. Results of hydrogen-extraction tests up to 650° C. X-ray and electron-diffraction studies show that heating to above the temperature range at which the plate softens does not destroy the normal preferred orientation. (N5, Cr)

62-N. An Approximate Theory of Order in Alloys. J. M. Cowley. *Physical Review*, ser. 2, v. 77, Mar. 1, 1950, p. 669-675.

Values of long and short-range order parameters obtained by solving the equations developed are in good agreement with experimental values found by X-ray diffraction methods. The theory is extended to calculation of configurational energy and specific heat, and to determination of order parameters for alloys of arbitrary composition in such binary systems as the Cu-Au alloys. 14 ref. (N10)

63-N. Modern Metallurgy of Cast Iron. H. Morrogh. *Engineering*, v. 169, Feb. 3, 1950, p. 136-138; Feb. 10, 1950, p. 166. A condensation.

Microstructures and transformations. Use of various elements to promote formation of nodular graphite. (To be continued.) (N8, E25, CI)

64-N. Concerning the Structure of Primary Solutions of Binary Alloys. (In French.) Léon Jollivet. *Comptes Rendus* (France), v. 229, Dec. 14, 1949, p. 1330-1332.

Applies the laws of solid-liquid equilibrium. Results of experimental investigation of solutions of Zn in Ag and of Sn in Pb agree with theoretical conclusions. (N12, Ag, Pb)

65-N. Thermomagnetic Study of Cementite Stability. (In French.) A. Michel and R. Bernier. *Revue de Métallurgie*, v. 46, Dec. 1949, p. 821-823; discussion, p. 823-824.

Experimental data indicate that the physicochemical properties of cementite may best be determined from study of kinetics of graphitization; and influence of substitution of Fe atoms by Mn, Ni, Cr, etc., and of C atoms by the "metalloids" Si, Ti, B, N, etc. (N8, ST)

66-N. Equilibrium Disturbances in the γ-α Transformation of Iron Caused by Insufficient Diffusion. (In German.) A. Wüstefeld. *Archiv für Metallkunde*, v. 3, Dec. 1949, p. 436-438.

Attempts to explain the embrittlement of sheets of ingot iron which occurs whenever its structure contains ferrite "envelopes" as the result of insufficient diffusion in the γ-phase. Experiments show that a steel may lose its resistance to age hardening by being heat treated above the A_2 transformation point. Conversely, it is frequently possible to impart resistance to age hardening by cold working and then heating for an extended time below the transformation temperature. (N8. Fe, ST)

67-N. Explanation of the Effect of Pressure on the Basis of Anisotropic Cold Age-Hardening. (In German.) Hugo Josef Seemann. *Zeitschrift für Metallkunde*, v. 40, Dec. 1949, p. 441-445.

Study of the effect of extension of Al alloys makes it possible to observe the natural age hardening process with changing structure of the nonrecrystallized alloy, since the "pressure effect" becomes evident

only as the alloy age hardens at room temperature. Experiments with annealed extended bars show that this effect can be eliminated by age hardening at elevated temperatures. 13 ref. (N7, Al)

68-N. The Structure of Graphite. (In German.) *Neue Giesserei,* v. 37 (new ser., v. 3), Jan. 1, 1950, p. 9.

Methods of determining the three-dimensional structures of graphite in cast-iron. (N8, CI)

69-N. Atomic Magnetic Moments of Transition Metals and Alloys and Interatomic Distances in Their Crystalline Lattices. I. Atomic Magnetic Moments and Interatomic Distances. (In Russian.) F. M. Gal'perin. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Physical Series, v. 13, Sept.-Oct. 1949, p. 574-595.

Results of experimental and theoretical investigation are in agreement with existing data, and indicate that a relation exists between atomic magnetic moments of transition metals and alloys and interatomic spaces in their crystalline lattices, and also types of the latter. 26 ref. (N11)

70-N. Mechanism of Combustion of Iron. (In Russian.) A. L. Veis and A. I. Rozlovskii. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry), v. 23, Nov. 1949, p. 1305-1310.

Investigation of combustion in a stream of oxygen led to the conclusion that oxygen diffuses through the oxide layer. This diffusion mechanism permits qualitative explanation of the mechanism of oxygen cutting. 12 ref. (N1, G22, Fe)

71-N. Two Types of Grain Boundary Migration in High-Purity Aluminum. Paul A. Beck and Philip R. Sperry. *Journal of Metals,* v. 188, Mar. 1950, p. 468A.

Application of a new technique for studying migration in Al which allows clear distinction between the two types. (N3, Al)

72-N. Diffusion Coefficient of Carbon in Austenite. Cyril Wells, Walter Batz, and Robert F. Mehl. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Mar. 1950, p. 553-560.

Values covering a wide range of temperature and composition were determined by statistical methods. The relation between concentration and diffusion coefficient, activation heat of diffusion, and the constant in the diffusion equation were obtained. (N1, ST)

73-N. Carbides in Long-Tempered Vanadium Steels. Walter Crafts and John L. Lamont. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Mar. 1950, p. 561-574.

Carbides in V-Cr-Mo steels were studied with the electron microscope after tempering up to 1000 hr. at 600-1400° F. It was found that alloy carbides are formed at the secondary hardening temperature by decomposition of the plate-like iron carbides and that vanadium carbide persists as much smaller particles than do Cr or Mo carbides. Conditions conducive to the formation of fine vanadium carbides are favorable for high temperature strength. (N8, AY)

74-N. A Study of Recrystallization and Grain Growth by Measurements of Internal Friction. T'ing-Sui Ke. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Mar. 1950, p. 581-585.

Study on Al, Cu, and Fe. Effect of complete recrystallization temperature, annealing time, previous cold work, and impurities. Method gives results in agreement with those of metallographic examinations. (N5, Q22, Al, Cu, Fe)

75-N. The Effect of Thermal Cycles on the Structure of Alloys: Diffusion Effects in Two-Phase Alloys. R. J. Davis and W. Hume-Rothery. *Proceedings of the Royal Society,* ser. A, v. 200, Feb. 22, 1950, p. 441-458.

A qualitative examination was made of a simplified two-phase system consisting of a single spherical particle embedded in an isotropic matrix in which the solubility of the particle phase varied with temperature. Shows that under continual cycles of temperature the particle will be surrounded by a "zone of influence" in which concentration varies with the period of the cycle, and outside which a steady state is set up where concentration is intermediate between equilibrium values at the two extremes of temperature. Magnitude of the zone of influence is calculated for various cases. 12 ref. (N1)

76-N. Thermo-Elastic Analysis of Allotropic Transformations of Steels. (In French.) Georges Vidal and Pierre Lescop. *Comptes Rendus* (France), v. 230, Jan. 9, 1950, p. 206-208.

Investigated on the basis of variations of Young's modulus in carbon steels (0.65 and 0.9% C) and alloy steel (0.38% C, 3.7% Ni, and 1.5% Cr) using the apparatus of Florisson

(determining the speed of sound in metals at a temperature θ).
(N6, CN, AY)

77-N. Role of Hydrogen in the Formation of Flakes. (In Russian.) N. A. Galaktinova. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Nov. 1949, p. 1666-1674.

A series of experiments made to clarify the status of H_2 in steel and its role in the formation of flakes. Results indicate that enrichment of the metal with H_2 essentially changes its characteristics: it acquires a silver-white color and becomes resistant to corrosion under normal conditions. Method of investigation, using a high-frequency vacuum furnace. 11 ref. (N15, ST)-

78-N. (Book) Progress in Metal Physics. Vol. I. Bruce Chalmers, editor. 401 pages. 1949. Interscience Publishers, 215 Fourth Ave., New York 3, N. Y. $9.50.

Various authors review progress in theory of alloys, theory of dislocations, crystal boundaries, age hardening, hardening response of steels, orientation in nonferrous metals, and diffusion of metals in metals. Individual contributions are abstracted separately. 569 ref. (N general)

79-N. Research on the Electrodeposition of Alloys. II. Structure of the Products. (In Italian.) Vincenzo Montoro. *Metallurgia Italiana,* v. 41, Nov.-Dec. 1949, p. 279-286.

Studied for Cu-Sn alloy deposits containing 51.5, 61.2, 62.0 and 62.3% Sn, by X-ray diffraction. Characteristics of supersaturated solid solutions present in the electrodeposits are defined. 23 ref. (N12, L17, Sn)

80-N. Basic Structure of the K-Absorption Edges of Transition-Element Atoms in Metals. (In Russian.) E. Vainshtein. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Jan. 1, 1950, p. 21-23.

Theoretical investigation indicates that the attempts of Beeman and Friedman to interpret the above structure result in disagreement with experimental data. Proposes a new interpretation which agrees quite closely with such data. (N11)

81-N. Structural Changes During Aging of Aluminum Containing 2% Copper. (In Russian.) M. I. Zakharova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Jan. 1, 1950, p. 55-56.

Dissociation of the above solid solution was investigated by means of X-ray diffraction, using monocrystals grown by recrystallization. (N7, Al)

82-N. On the Growth of Metallic Crystals From the Vapor Phase. George R. Keepin, Jr. *Journal of Applied Physics,* v. 21, Mar. 1950, p. 260-261.

Effects of various procedural and environmental changes on growth of Cd and Zn crystals from the vapor. (N15, Cd, Zn)

83-N. The Thermal Stabilization and Sintering of Gold Smoke Deposits. Louis Harris, David Jeffries, and Benjamin M. Siegel. *Journal of Chemical Physics,* v. 18, Mar. 1950, p. 261-265.

Gold smokes made by evaporation in an inert gas atmosphere are initially in a thermodynamically unstable state. A theory based on diffusion of vacant sites to the surface of the crystallites was developed to describe the process by which the deposit approaches equilibrium. Measurement at different temperatures of the change of resistance associated with the loss of vacant sites was made. When heated above 100° C., the deposits sinter rapidly and undergo pronounced changes in optical properties. However, a gold smoke can be stabilized by heat treatment at 70° C. so that sintering proceeds at an appreciably lower rate. 12 ref. (N15, H15, Au)

84-N. Spacings of Retained Austenite in Quenched White Cast Iron. W. J. Wrazej. *Nature,* v. 165, Mar. 18, 1950, p. 447-448.

To provide a comparison between estimated parameters of retained austenite in samples of high-carbon steel with those of samples that have, after heating, retained a sufficient quantity of carbon, a white cast iron was chosen in which the total amount of alloying elements was less than 1%, that is, similar in quality and quantity to those in mild plain-carbon steels. Samples in the form of flat lumps were quenched from a series of A_c temperatures, then polished and examined both microscopically and by X-rays. (N8, CI)

85-N. A General Literature Survey of Diffusion in Metals. R. O. Hutchison. *U. S. Atomic Energy Commission, AECU 401,* June 10, 1949, 36 pages.

Informative abstracts referring to the more prominent literature on the subject. The articles are abstracted according to their usefulness in an investigation carried out by the author.

86-N. Micrographic Confirmation of the Reversibility of the Transformation Associated With Annealing Brittleness of Steels Having Low Nickel and Chromium Contents. (In French.) Pierre A. Jacquet. *Comptes Rendus* (France), v. 230, Feb. 13, 1950, p. 650-651.

Structural changes associated with this reversibility of transformation in steels containing 0.30% C, 3.25% Ni, and 1.65% Cr were investigated. Analysis of the micrographs explains the well-known scattering of the impact-strength values of specimens treated under identical conditions and the influences of very slight variations of annealing conditions on impact strength and transition temperature. (N8, Q23, Q6, AY)

87-N. X-Ray Study of Annealing Brittleness of Steel Having Low Nickel and Chromium Contents. (In French.) Adrienne R. Weill. *Comptes Rendus* (France), v. 230, Feb. 13, 1950, p. 652-654.

Investigation using X-ray diffraction and electropolished specimens used by Jacquet (see item 86-N above) indicate that atoms of the element responsible for brittleness dissolve in the ferrite network during annealing, causing marked internal distortions. (N8, Q23, AY)

88-N. Study by Means of Microhardness Determination of the Multiphase Diffusion of Beryllium Into Very Pure Aluminum. (In French.) Helmut Bückle and Jacques Descamps. *Comptes Rendus* (France), v. 230, Feb. 20, 1950, p. 752-754.

Sheets of very pure Al and Al-Be alloy (1.06% Be) were mechanically and electrolytically polished, then welded together. These specimens were maintained at a series of constant elevated temperatures for 1-25 days, aged at 100° C. for 1 hr., then quenched in water. Diffusion results are revealed by microhardness determinations. (N1, Q29, Al, Be)

89-N. Reorientation as an Example of Oriented Atom Distribution. (In German.) Otto Dahl. *Zeitschrift für Metallkunde,* v. 41, Jan. 1950, p. 8-9.

Effect of degree and time of heat treating on electrical resistance of $AuCu_3$ was determined. Shows that formation of a superlattice results in basically the same type of reorientation curves as the ones obtained with age-hardenable alloys. (N10, Au, Cu)

90-N. Growth Processes in Zinc and Cadmium Single Crystals. (In German.) Arend Eisenloeffel and Iwan N. Stranski. *Zeitschrift für Metallkunde,* v. 41, Jan. 1950, p. 10-13.

Experiments to study the formation of metallic single crystals from the melt and their growth in the vapor phase. An explanation is given for the formation of surface and bulk structures. (N12, Zn, Cd)

91-N. The Law of Corresponding Recovery Conditions. (In German.) Kurt Lücke. *Zeitschrift für Metallkunde,* v. 41, Feb. 1950, p. 40-41.

Limitations of the above law for the recovery of lattice distortions of cold worked metals. Measurements of the changes of electrical resistance of copper wire on recovery prove validity of the law for this case. (N4)

92-N. The Thermodynamics of Age-Hardening of Systems With Negative Heats of Solution. (In German.) Erich Scheil. *Zeitschrift für Metallkunde,* v. 41, Feb. 1950, p. 41-45.

Shows that the theory of regular solid-solution phases fails in the case of solid solutions with negative heats of solution. The single-phase precipitation of such solid solutions can be explained by expansion of Wagner and Schottky's ideal defective-orientation theory. This theory also furnishes a method of calculating constitution diagrams with orientation phases and areas of segregation. 12 ref. (N7)

93-N. Hardening and Softening of Age-Hardenable Aluminum Alloys by Heat Treatment and Working. (In German.) Gunter Wassermann. *Zeitschrift für Metallkunde,* v. 41, Feb. 1950, p. 50-55.

Al-Cu, Al-Cu-Mg, and Al-Cu-Mg alloys containing about 95% Al were investigated. Experiments made by rolling sheet metal at stated intervals of aging show that the hardening effect of the rolling operation steadily decreases the longer the alloys have been age-hardened. The Fraenkel effect on specimens that have been age-hardened, cold rolled, and again heat treated at the original temperature of age-hardening is explained. (N7, Al)

94-N. Electrocrystallization of Metals. (In Russian.) V. V. Gikhailov. *Uspekhi Khimii* (Progress in Chemistry), v. 18, Nov.-Dec. 1949, p. 724-736.

Formation and growth of crystals during electrolysis. Influence of different factors, such as concentration of solution and current density on rate of nucleation and rate of crystal growth. 53 ref. (N12)

95-N. Transformation Characteristics of Induction-Heated Steels. *Industrial Heating,* v. 17, Apr. 1950, p. 614.

Condensed from "The Effect of Alloying Elements on the Transformation Characteristics of Induction-Heated Steels", by Joseph F. Libsch, Wen-Pin Chuang, and William J. Murphy.

Previously abstracted from *American Society for Metals,* Preprint 21, 1949. See item 18B-168, 1949.
(N8, J2, AY)

96-N. Surface Effect Occurring on High Carbon Steels Heated and Cooled in Vacua. G. C. Smith and M. J. Olney. *Research,* v. 3, Apr. 1950, p. 194.

It was observed that hypereutectoid steels, heated into the austenite region and cooled in high vacuum, become covered with a gray-black film. Nature of this film was investigated by electron diffraction, X-ray powder photography, and friction measurements. These investigations prove conclusively that the film consists of graphite. (N8, CN)

97-N. The Gas Phase in Equilibrium With a Solution of Carbon, Oxygen, Hydrogen, and Nitrogen in Liquid Iron. J. D. Fast. *Philips Research Reports,* v. 5, Feb. 1950, p. 37-45.

From literature data, composition of the gas phase in equilibrium with a dilute solution of C, O_2, H_2, and N_2 in liquid iron was computed. In the range from 1800 to 2000° K. equilibrium pressures are approximated by formulas presented. (N16, Fe)

98-N. An Electron-Microscopic Study of Metal Oxides and Metal Oxide Catalysts. James T. McCartney, Bernard Seligman, W. Keith Hall, and Robert B. Anderson. *Journal of Physical & Colloid Chemistry,* v. 54, Apr. 1950, p. 505-519.

Changes in the above during reduction were studied by electron-microscopic and adsorption methods. Metal oxides sinter considerably during reduction; but in the presence of promoters or carriers, extent of sintering is decreased. The data are discussed with respect to Huttig's theory of sintering. The phenomena may be explained by surface diffusion of freshly formed metal. 20 ref. (N1, M21)

99-N. The Absorption of Gases by Titanium and Zirconium. C. F. P. Bevington, S. L. Martin, and D. H. Mathews. *Proceedings of the XIth International Congress of Pure and Applied Chemistry* (July 1947), v. 1, p. 3-16.

Absorption of individual gases, and structures of the gas-metal systems. New data on the Ti-H and Zr-N systems and on the effect of absorbed O_2, N_2, and CO on sorption of H_2 presented. 45 ref. (N15, Ti, Zr)

100-N. The Extension of the Ar_1 Range With Carbide Formation in Mild Steel Due to High-Temperature Treatment. J. H. Whiteley. *Journal of the Iron and Steel Institute,* v. 164, Apr. 1950, p. 399-405.

Isolated areas containing large amounts of massive or free carbide in two mild steel ingots led to experimental work. It was found that when this steel was cooled slowly from a very high temperature, the Ar_1 range was widely extended and that the free carbide was formed directly from the residual austenite. Length of the extended range was determined by temperature of heating above 1200° C. and by Mn content. Effects appeared to be confined to mild and low-carbon steels. (N8, CN)

101-N. A Note on the Overheating of Steel. E. C. Rollason and D. F. T. Roberts. *Journal of the Iron and Steel Institute,* v. 164, Apr. 1950, p. 422-424.

From published data, it has been concluded that the amount of MnS present in a steel is an important criterion of minimum overheating temperature. A new graphical presentation shows that this temperature is a function of S content and Mn/S ratio. This helps to elucidate anomalous results. (N12, ST)

102-N. Recrystallization of Pure Iron After the $\gamma - \alpha$ Transformation. (In German.) Georg Masing. *Archiv fur das Eisenhuttenwesen,* v. 21, Jan.-Feb. 1950, p. 49-51.

Specimens of highly rolled sintered carbonyl iron were quenched in different media and to different temperatures. Results show that the gamma-to-alpha transformation leads to an unstable condition, having a tendency toward recrystallization. (N5, Fe)

103-N. Dilatometric Study of Crystal Growth at High Temperatures. (In Russian.) Ya. I. Ol'shanskii. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Feb. 1, 1950, p. 641-643.

Technique for temperatures up to 2000° C. Experiments were performed on specimens of oil and coal-tar-pitch coke but apparently are also suitable for metals. (N12)

104-N. Energy of Activation of Superlattice Transformations. (In Russian.) N. S. Akulov and E. P. Svirina. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Feb. 11, 1950, p. 789-791.

Theoretical analysis of the above, followed by correlation with results of experimental investigation of the kinetics of the superlattice transformation in molybdenum permalloy (77.5% Ni, 19.5% Fe, 3% Mo) at 400, 440, 470, and 480° C. (N10, Ni)

105-N. Relationship Between Lattice Dimensions of Austenite and the Beginning of Martensite Transformation in Fe-C Alloys. (In Russian.) V. I. Arkharov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Feb. 11, 1950, p. 833-836.

In carbon steels with various C contents, at the temperature of the beginning of martensite transformation, the austenite lattice dimensions are the same—3.607 Å. Therefore, it is concluded that lattice-dimension changes caused by temperature changes are equivalent to those accompanying carbon dissolution, and that the beginning of the martensite transformation corresponds to a critical value of specific volume. (N8, Fe)

106-N. Powder Metallurgy Methods for Research Purposes. Henry H. Hausner. *Sylvania Technologist,* v. 3, Apr. 1950, p. 2-8.

Development of powder-metallurgy processes and how they can be used to solve various metallurgical problems, such as nucleation, self-diffusion, homogenization, and the development of phase diagrams. 12 ref. (N1, N2, M24, H general)

107-N. Measurement of Retained Austenite in Carbon Steels. B. L. Averbach, L. S. Castleman, and M. Cohen. *Transactions of American Society for Metals,* v. 42, 1950, p. 112-119; discussion, p. 119-120.

Previously abstracted from Preprint. See item 4B-94, 1949. (N8, M22, CN)

108-N. The Effect of Alloying Elements on the Transformation Characteristics of Induction-Heated Steels. Joseph F. Libsch, Wen-Pin Chuang, and William J. Murphy. *Transactions of American Society for Metals,* v. 42, 1950, p. 121-146; discussion, p. 146-149.

Previously abstracted from Preprint. See item 18B-168, 1949. (N8, J2, AY)

109-N. Preparation of Metal Single Crystals. A. N. Holden. *Transactions of American Society for Metals,* v. 42, 1950, p. 319-346.

Previously abstracted from Preprint. See item 11-318, 1949. (N12)

110-N. Surface Diffusion of Radioactive Silver on Silver. Richard A. Nickerson and Earl R. Parker, *Transactions of American Society for Metals,* v. 42, 1950, p. 376-386.

Rate of diffusion was measured at three temperatures by using radioactive Ag atoms as tracers. Activation energy for self-surface-diffusion was calculated. (N1, Ag)

111-N. A New Theory for the Solid State. Carl A. Zapffe. *Transactions of American Society for Metals,* v. 42, 1950, p. 387-398.

The solid state in general, and for metals in particular, is a condition of aggregation of subcrystalline units of colloidal dimensions, tentatively termed micelles, originating or existing within the previous liquid or gaseous state and carrying aspects of their definition and separateness into the solid state as an inherently discontinuous structure on a colloidal scale. All mechanical physical phenomena depend upon and/or involve intermicellar surfaces and chemical phenomena. 26 ref. (N12)

112-N. Isothermal Temper Embrittlement. Leonard D. Jaffe and Donald C. Buffum. *Transactions of American Society for Metals,* v. 42, 1950, p. 604-614; discussion, p. 614-618.

Previously abstracted from Preprint. See item 18B-169, 1949. (N8, Q23, AY)

113-N. Iron-Manganese and Iron-Manganese-Nickel Alloys. Irvin R. Kramer, Stewart L. Toleman, and Walter T. Haswell. *Transactions of American Society for Metals,* v. 42, 1950, p. 1260-1290; discussion, p. 1290-1294.

Previously abstracted from Preprint. See item 3B-198, 1949. (N8, Q23, Fe)

114-N. Subcritical Isothermal Graphitization. H. A. Schwartz, J. D. Hedberg, and R. Eriksen. *American Foundrymen's Society,* Preprint No. 50-2, 1950, 6 pages.

Shows that rate of secondary graphitization in white cast iron cannot be defined without first defining conditions of an intermediate stage of graphitization during the cooling process. (N8, CI)

115-N. An Introduction to the Annealing of Nodular Iron. J. E. Rehder. *American Foundrymen's Society,* Preprint No. 50-17, 1950, 12 pages.

Time-temperature relationships for the graphitization of primary cementite and of pearlite were determined and results compared with those for white cast irons and blackheart malleable irons. Mechanical properties of bars with varying amounts of pearlite removed. (N8, Q general, CI)

116-N. A New Theory of Recrystallization Nuclei. R. W. Cahn. *Proceedings of the Physical Society*, v. 63, sec. A, Apr. 1, 1950, p. 323-336.

A new theory of nucleus formation when a cold worked metal is annealed is presented. The nuclei are believed to be formed in the most distorted parts of the lattice, in the "local curvatures" postulated by Burgers. A quantitative theory found to be capable of accounting for all the experimental data on nucleation rates is developed. 37 ref. (N2)

117-N. Modification in Aluminium-Silicon Alloys. B. M. Thall and Bruce Chalmers. *Journal of the Institute of Metals*, v. 77, Mar. 1950, p. 79-97.

During modification of Al-Si alloys by small additions of Na, properties and structure of the alloys are substantially improved. Thermal data on the modified Al-Si alloys were redetermined and semi-quantitative determinations of Na content were made by means of a radioactive technique. Formulation of a new theory of modification based on the influence of Na on the balance of interfacial tensions during solidification. Application of this theory to the mechanism of eutectic solidification. 20 ref. (N12, Al, Si)

118-N. Structural Transformations Resulting From Heat Treatment of Supercooled Manganese-Containing Al-Cu-Mg Alloys. (In German.) K. L. Dreyer and M. Dudek. *Metall*, v. 4, Mar. 1950, p. 87-90.

Results of study of Al alloys containing 4.2% Cu, 0.8% Mg, and 0-1% Mn are illustrated by photomicrographs. The amount of U-phase increases with Mn content above 0.1% and decreases with the heat treating temperature above 500° C. A new type of crystal was identified as the equilibrium phase Al_6Mn. (N9, Al)

119-N. Studies in the Diffusion of Molten Aluminum in Various Kinds of Steel. (In Japanese.) Shin Matsumoto and Torao Kobayashi. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Sept. 1949, p. 4-9.

Diffusion of Al in carbon and alloy steels and cast iron at 670-800° C. for 1-10 min. was investigated using microscopic examination and hardness tests. Rate of diffusion increased with temperature; but was retarded by increasing concentrations of carbon and by Ni and Fe, and accelerated by Cr. (N1, Al, ST, CI)

120-N. The Promoting Effect of Al and Si on the Graphitization of Chilled Cast Iron. (In Japanese.) Sigeya Sagawa. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Sept. 1949, p. 9-13.

Since the literature did not indicate conclusively which of the above elements is superior for graphitization of cast iron, experiments were made for a range of concentrations up to about 3%. Shows that Al is more effective than Si in all concentrations and that there is a linear relationship between log t (time of graphitization) and % Si or Al. (N8, CI)

121-N. Research on the Influence of Composition and Temperature on the Time of Graphitization of Chilled Cast Iron. (In Japanese.) S. Sagawa. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Oct. 1949, p. 17-21.

Investigated for nine specimens containing various percentages of C and Si. They were held in a molten Pb bath at various constant temperatures, for various periods, then quenched and microscopically examined. (N8, CI)

122-N. Studies on the Changes of Various Properties of Metals and Alloys Due to Twisting. II. (In Japanese.) Nobuo Shiota. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Oct. 1949, p. 22-25.

Recrystallization of metals and effects of added elements were studied using the apparatus described in Part I. A wide variety of ferrous and nonferrous metals and alloys was investigated. Two types of recovery were noted. It was found that recrystallization rate of alloys exceeds that of pure metals and is more discontinuous. (N5)

123-N. Studies on the Diffusion of Various Metals in Solid Copper. (In Japanese.) Keizo Niimi. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Nov. 1949, p. 1-7.

Rates of diffusion of Ni, Sn, Ag, Zn, Si, and Sb, respectively, in solid Cu, were first determined. Then rates of simultaneous diffusion of Ni+Sn, Ag+Zn, and Si+Sb, in Cu, were determined. Microstructures and diffusion-rate constants. 37 ref. (N1, Cu)

124-N. A Note on the Eutectoid Transformation of the Silver-Rich, Beta, Aluminum-Silver Alloys, Based on Microstructural Observations. (In Japanese.) Keizo Niimi. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Nov. 1949, p. 7-11.

Alloys containing 6.5-10% Al and

quenched from the β-range were studied in connection with the heat treatment diagram suggested by Iwase and Takenchi's theory (1941-42). Results indicate that the eutectoid transformation is related to the form of heat treatment. (N9, Ag)

125-N. Studies on the Diffusion of Molten Al Alloys in Carbon Steel. II. Shin Matsumoto and Torao Kobayashi. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Nov. 1949, p. 11-13.

Results of study for Al-Zn, Al-Cu, and Al-Si alloys containing 2-18% of the second element. Formation of corrosion resistant films by this treatment was studied by means of weight changes. (N1, L15, CN, Al)

126-N. Graphitisation in the Malleable Iron Process. H. G. Hall. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. B146-B160.

Previously abstracted from *Foundry Trade Journal.* See item 4B-11, 1949. (N8, CI)

127-N. Electron Microscopic Investigation of the Decomposition of Austenite in the Pearlite-Troostite Region. (In Russian.) V. D. Sadovskii, R. M. Lerinman, and A. M. Polyakova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Mar. 11, 1950, p. 299-301.

Investigated for a steel containing 0.41% C, 1.38% Cr, and 3.34% Ni. Electron micrographs of structures resulting from isothermal decomposition at 625, 575, and 550° C. are presented. Analysis of these micrographs indicates that a characteristic laminar structure is formed above and below the temperature of maximum rate of decomposition. Upon decrease of this temperature, thickness and size of the laminations decrease. (N8, M21, AY)

128-N. Transformation of 8630 Steel; Continuous Cooling and Isothermal Transformation Correlated With End Quench Hardenability Specimen. R. A. Grange, J. F. Boyce, and V. G. Peck. *Metal Progress,* v. 57, May 1950, p. 636B.

A time-temperature phase diagram with typical phases shown by photomicrographs. (N8, AY)

129-N. The Transformation of Austenite in 8630 Steel. R. A. Grange, J. F. Boyce, and V. G. Peck. *Metal Progress,* v. 57, May 1950, p. 637-642.

Transformation characteristics and microstructure of 8630 low-alloy steel. Isothermal and continuous cooling diagrams, hardness and microstructural variations along the end-quenched hardenability bar, data on the martensite range, and optical and electron micrographs. (N8, AY)

130-N. A Note on the Formation and Structure of Iron Dendrites in a Magnesium Alloy. Harry C. Burnett, Jr., and Herbert C. Vacher. *Journal of Research of the National Bureau of Standards,* v. 44, Apr. 1950, p. 443-446.

Metallographic examination of commercially pure Mg that had been heated to 1000° C. in an iron crucible revealed iron dendrites. Further examination by the microradiographic method showed that the dendrites grew at uniform rates in the dodecahedral directions. (N12, Mg)

131-N. Influence of Impurities on the Recrystallization of High-Purity Aluminum. (In French.) H. Chossat. *Revue de Métallurgie,* v. 47, Mar. 1950, p. 167-182.

Shows that the course of Al recrystallization is markedly influenced by traces of impurities; the difference of recrystallization temperatures of 99.998 and 99.99% Al may be as much as 150° C. However, a larger impurity content (0.7-1%) influences this temperature to a much lesser extent, the difference being a maximum of 30° C. (To be continued.) (N5, Al)

132-N. Order-Disorder. (In German.) B. Kockel. *Annalen der Physik,* ser. 6, v. 7, Nos. 1-2, 1950, p. 18-32.

Fundamental theoretical analysis shows that it is impossible to explain the observed behavior on the theory that only adjoining atom pairs contribute to orientation energy. This theory helps, however, to explain Weiss' theory of ferromagnetism. 12 ref. (N10)

133-N. The Orientation Dependence of the Rate of Grain Boundary Migration. Paul A. Beck, Philip R. Sperry, and Hsun Hu. *Journal of Applied Physics,* v. 21, May 1950, p. 420-425.

Very small recrystallized grains of a large variety of orientations were produced locally in lightly rolled high-purity Al crystals. Rate of growth of these small grains varied greatly, depending on their relative orientation with respect to the matrix crystal. Results indicate that recrystallization textures developing in the spontaneous recrystallization of deformed single crystals can be accounted for by the orientation dependence of rate of growth. 20 ref. (N5, Al)

134-N. Diffusional Viscosity of a Polycrystalline Solid. Conyers Herring.

Journal of Applied Physics, v. 21, May 1950, p. 437-445.

According to a suggestion of Nabarro, any crystal can change its shape by self-diffusion in such way as to yield to an applied shearing stress, and this can cause the macroscopic behavior of a polycrystalline solid to be like that of a viscous fluid. It is possible that this phenomenon is the predominant cause of creep at very high temperatures and very low stresses, though not under more usual conditions. The theory is developed quantitatively, and calculations of rate of creep, or of effective viscosity, are given for aggregates of quasi-spherical grains and for wires composed of cylindrical grains. 22 ref. (N1, Q3)

135-N. Synthesis of Cementite. L. J. E. Hofer and E. M. Cohn. *Journal of Chemical Physics,* v. 18, May 1950, p. 766-767.

Known methods of synthesis suffer from the disadvantages that the product is formed in poor yield, is contaminated with free carbon, or is highly sintered. New method that overcomes these difficulties. (N8, Fe)

136-N. Isothermal Rate of Solidification of Small Droplets of Mercury and Tin. D. Turnbull. *Journal of Chemical Physics,* v. 18, May 1950, p. 768-769.

(N12, Hg, Sn)

137-N. Correlation of Liquid-Solid Interfacial Energies Calculated From Supercooling of Small Droplets. D. Turnbull. *Journal of Chemical Physics,* v. 18, May 1950, p. 769.

Data applicable to Hg, Ga, Sn, Bi, Pb, Sb, Ge, Ag, Au, Cu, Mn, Ni, Co, Fe, Pd, and Pt. Data are correlated mathematically. (N12, P10)

138-N. Overheating and Burning. Part III. The Influence of Excessive Reheating Temperatures on the Mechanical Properties and the Structure of Alloy Steels. A. Preece and A. Hartley. *Iron and Steel,* v. 23, May 11, 1950, p. 201-205; discussion, p. 262-264.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 32-N, 1950. (N8, Q general, AY)

139-N. Severely Heated Steel Grain-Boundary Phenomena. T. Ko and D. Hanson. *Iron and Steel,* v. 23, May 11, 1950, p. 208-215; discussion, p. 262-264.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 33-N, 1950. (N8, CN)

140-N. Overheating; A Note on the Influence of Sulphur Content and Mn/S Ratio. E. C. Rollason and D. F. T. Roberts. *Iron and Steel,* v. 23, May 11, 1950, p. 215-216; discussion, p. 262-264.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 101-N, 1950. (N12, ST)

141-N. Mild Steel; Extension of the Ar_1 Range With Carbide Formation Due to High-Temperature Treatment. J. H. Whiteley. *Iron and Steel,* v. 23, May 11, 1950, p. 217-219; discussion, p. 264-266.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 100-N, 1950. (N8, CN)

142-N. The Calculation of the Activation Energies of Recovery and Recrystallization From Hardness Measurements on Copper. N. Thorley. *Journal of the Institute of Metals,* v. 77, Apr. 1950, p. 141-161.

Changes which take place in the crystallites of a metal when it is cold worked and then annealed are reviewed, and suggestions are made for observing these changes directly, using X-ray line-broadening measurements, in an investigation of the fundamental processes of annealing. Cook and Richards's two-stage theory of recrystallization for an isothermal anneal is extended, and a new equation obtained which fits their experimental results for hardness of copper better than previous equations. A direct method is developed by which activation energies of both recovery and recrystallization processes are obtained separately. 12 ref. (N5, Cu)

143-N. The Penetration of Hydrogen Into Steel. (In German.) Theo Bruggemann. *Chemische Technik,* v. 1, Dec. 1949, p. 178-182.

Mechanism by which hydrogen penetrates the steel and means of preventing this undesirable effect were investigated. Injurious effects of H_2 on properties of steel. 36 ref. (N1, ST)

144-N. Nitriding of Iron. (In Russian.) I. R. Krichevskii and N. E. Khaganova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Mar. 21, 1950, p. 481-484.

It has been shown that γ-phase is incompletely formed during nitriding of iron by molecular N_2 at high pressures. Rate of formation of this phase during nitriding with an NH_3-H_2 mixture at atmospheric pressure was studied to help explain this fact. 12 ref. (N8, J28, Fe)

145-N. Activation Energy for Recrystallization in Rolled Copper. B. F. Decker and D. Harker. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, June 1950, p. 887-890.

Recrystallization in oxygen-free high-conductivity Cu and spectroscopically pure Cu was followed by X-ray diffraction determinations of the amount of material with the cold worked and recrystallized textures in specimens which had been given various heat treatments.
(N5, P13, Cu)

146-N. Order in Metallic Crystals. R. Smoluchowski. *Physics Today,* v. 3, June 1950, p. 16-19.

Recent results obtained in the study of binary alloys in which a change in the distribution of the two kinds of atoms takes place. These transformations are usually referred to as order-disorder phenomena. (N10)

147-N. Effect of Beryllium on D.T.D. 300; Result of Additions on Grain Size and Tensile Properties. A. L. Mincher. *Metal Industry,* v. 76, June 2, 1950, p. 435-436.

Possible effects of Be added to Al alloy (10% Mg) to prevent reaction with moisture in sand molds. Tensile properties are greatly influenced by changes in grain size. Results show that Be additions do not cause grain coarsening.
(N3, Q general, Al, Be)

148-N. The Formation of Sigma Phase in 17 Per Cent Chromium Steel. J. J. Heger. *American Society for Testing Materials,* Preprint 53, 1950, 4 pages.

By using cold work and extended heating periods at 1050° F., sigma phase was formed and identified in 17% Cr (Type 430) stainless steel.
(N8, SS)

149-N. Concerning the Transformation of Cobalt. (In French.) Max Sage. *Comptes Rendus* (France), v. 230, Apr. 3, 1950, p. 1354-1356.

A direct verification by means of X-ray diagrams of the mechanism of allotropic transformation of cobalt: slip of the (111) planes of the cubic phase which induces the formation of hexagonal phase with (001) planes. X-ray diagrams.
(N6, Co)

150-N. Equilibrium Diagram of the Order-Disorder Transformation in Ferronickels Having a Composition Close to Ni_3Fe. (In French.) Emile Josso. *Comptes Rendus* (France), v. 230, Apr. 17, 1950, p. 1467-1469.

Application of a differential dilatometric method for determination of the critical temperature of the above transformation. Equilibrium diagram shows that the transformation is plotted for Ni contents of 68-80%. (N10, M24, Ni)

151-N. Influence of Impurities on the Recrystallization of High-Purity Aluminum. (Concluded.) (In French.) H. Chossat. *Revue de Métallurgie,* v. 47, Apr. 1950, p. 306-314; May 1950, p. 343-354.

April installment: Study of the recrystallization of 99.99% Al by isothermal annealing and a study of variations of hardness as a function of temperature of annealing and cold working. Final installment: Variation of mechanical properties as a function of grain size, and general conclusions of the study. Appendix on analytical methods for determination of Fe, Si, and Mg. 36 ref.
(N5, Q general, M27, S11, Al)

152-N. Mechanical Recovery of Aluminum Monocrystals. (In German.) Georg Masing and Josef Raffelsieper. *Zeitschrift fur Metallkunde,* v. 41, Mar. 1950, p. 65-70.

Because of Si content, commercially pure Al was found unsuitable for the study. Recovery of highly pure Al monocrystals was studied with the aid of the tensile test and at different temperatures. The activation energy of recovery decreases linearly with increasing internal stresses. 19 ref.
(N4, Q27, Al)

153-N. The Kinetics of Age Hardening. (In German.) Werner Köster. *Zeitschrift fur Metallkunde,* v. 41, Mar. 1950, p. 71-75.

Review of literature shows that age hardening is not, for all metals, a single sequence of structural changes, but may be the result of two different and independent atomic reactions. 30 ref. (N7)

154-N. The Problem of Orientation in Solid Solutions. (In German.) Iris Runge. *Annalen der Physik,* ser. 6, v. 7, Apr. 1, 1950, p. 129-146.

Computes by a statistical method the temperature at which the constituents of a binary system form superlattices, revealing new lines in the X-ray diagram. Shows that total energy and specific heat as a function of temperature can be determined from degree of orientation.
(N5, N10)

155-N. The Diffusion of Carbon in Sintered Alloy Steels. (In German.) W. Seith and H. Schmeken. *Zeitschrift fur anorganische Chemie,* v. 262, May 1950, p. 129-146.

The diffusion rates of carbon in

steels containing Co, Cr, Cu, Mn, Ni, Si, V, and W at 1000-1200° C. were determined as well as effect of a third alloying component. Results are correlated with position in the periodic system, lattice constants, and heat of carbide formation. 28 ref. (N1, AY)

156-N. Formation of Round Crystals and Existence of Molybdenum Carbide, MoC. (In German.) W. Dawihl. *Zeitschrift fur anorganische Chemie*, v. 262, May 1950, p. 212-217.

Research confirmed the assumption that not only oxide or nitride impurities, but also disturbances of internal crystal structure may cause the formation of round crystals. MoC formed under the author's experimental conditions is unstable. Of greater stability is a solid solution of a carbide whose composition is approximately MoC+WC. 12 ref. (N12, M26, Mo)

157-N. Influence of Boron on Kinetics of Austenite Transformation in Steel. (In Russian.) N. T. Gudtsov and T. N. Nazarova. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Mar. 1950, p. 386-393.

Adding a boron alloy of complex composition (0.001-0.003% B) to medium-carbon Cr-Si-Mn steel during melting causes a decrease in the tendency toward grain growth of austenite, has practically no effect on position of the critical points during cooling, and markedly increases depth of heat treatment penetration in the case of normal annealing temperature and time. (N8, ST)

158-N. Law of the Approach to Saturation for Martensite. (In Russian.) N. S. Akulov and K. M. Bol'shova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Apr. 1, 1950, p. 633-636.

Possibility of application of law developed by Akulov for the general case of polycrystalline ferromagnetics to nonequilibrium solid solutions containing marked local stresses and to heterogeneous alloys. The possibility was proven theoretically and experimentally for carbon steels containing 0.49, 0.75, 1.03, and 1.12% C, and differently heat treated. (N8, CN)

159-N. ε-Phase of Nitrided Iron. (In Russian.) I. R. Krichevskii and N. E. Khazanova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Apr. 1, 1950, p. 677-680.

True conditions of equilibrium were determined for the system nitrogen—ε-Fe using the method of "combined equilibrium constants". Application of this method. Obtained data consisting of reaction and equilibrium constants, compositions, and molar volumes of γ and ε phases during their existence, and volatility of nitrogen between 400 and 600° C. (N8, M24, Fe)

160-N. The Diffusion of Carbon in Sintered Iron of Different Densities. (In German.) W. Seith and H. Schmeken. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie*, v. 54, May 1950, p. 222-224.

Experiments show that the diffusion of carbon from carbonaceous into carbon-free sintered iron increases with the density of the latter and with temperature. (N1, H16, Fe)

161-N. Measurement of Self-Diffusion of Silver Without Radioactive Tracers. G. C. Kuczunski. *Journal of Applied Physics*, v. 21, July 1950, p. 632-635.

New method for measurement of volume self-diffusion is based upon the relationship of rate of sintering of metallic wires to coefficients of self-diffusion. The values of the self-diffusion coefficients for silver obtained by this method are in good agreement with those obtained by the radioactive-tracer method. (N1, Ag)

162-N. X-Ray Measurement of Long Range Order in β-Brass. D. Chipman and B. E. Warren. *Journal of Applied Physics*, v. 21, July 1950, p. 696-697.

Determined by measuring the integrated intensity of the (100) superstructure reflection from a single crystal held at various temperatures. The measured long-range-order parameter S is in satisfactory agreement with theoretical predictions. (N10, Cu)

163-N. Continuous Pole Figure Study of Magnetic Recrystallization. (In English.) R. Smoluchowski and R. W. Turner. *Physica*, v. 16, Apr. 1950, p. 397-401.

Equipment and procedures for study of the effect of a magnetic field applied during recrystallization on preferred orientation of grains in a magnetic alloy. Typical results are illustrated. (N5, M23)

164-N. Analogies Between Steels and Aluminium Bronzes. H. Laplanche. *Institute of British Foundrymen*, Paper No. 977, 1950, 17 pages (Advance Copy).

Analogy between thermal diagrams of Fe-Fe_3C and Al-Cu; of microstructure after very slow cool-

ing; of as-cast structures, in martensitic transformation, between additive isothermal decomposition of γ-phase in steels and β-phase in Al-bronzes. 149 ref. (N8, N9, ST, Cu)

165-N. A Theory of Globular Graphite Formation in Cast Iron. (In Japanese.) Ichiro Iitaka. *Journal of the Casting Institute of Japan,* v. 22, no. 2, 1950, p. 1-5.

Theory is developed strictly on a fundamental physicochemical basis. It is said to be consistent with known experimental observations. (N8, CI)

166-N. Austenite Formation During Tempering and Its Effects on Mechanical Properties. E. F. Bailey and W. J. Harris, Jr. *Journal of Metals,* v. 188, Aug. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 997-1000.

Results of experiments on kinetics of austenite formation for a low-C, Mn-Ni steel on tempering at various temperatures; on decomposition characteristics; and on relation of mechanical properties and phases present. 12 ref. (N8, Q general, AY)

167-N. Recrystallization Reaction Kinetics and Texture Studies of a 50 Iron, 50 Nickel Alloy. William E. Seymour and David Harker. *Journal of Metals,* v. 188, Aug. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1001-1004.

Recrystallization-rate curves are plotted from X-ray spectrometer data and activation energy is calculated for the reaction. A multiple-crystal orientation was found for the as-rolled material, and a cube texture for the product of recrystallization in the range 500-600° C. (N5, M26, Ni, Fe)

168-N. Production and Examination of Zinc Single Crystals. D. C. Jillson. *Journal of Metals,* v. 188, Aug. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1005-1008.

Method and equipment developed and used for growth of single crystals of high purity Zn, of substantial size and of various orientations, in substantial numbers, together with results of some tests of degree of perfection of the product. 11 ref. (N12, Zn)

169-N. An Experimental Survey of Deformation and Annealing Processes in Zinc. D. C. Jillson. *Journal of Metals,* v. 188, Aug. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1009-1018.

Zn single-crystal specimens of high purity and quality were used in a study of various types of deformation under various conditions. Deformed specimens were annealed to study recovery and recrystallization. Profitable areas for more detailed work. 50 ref. (N4, N5, Q24, Zn)

170-N. "Check-Mark" Defects Appearing on Electrolytic Copper Wires. (In Portuguese.) Mario Silva. *Boletim da Associacao Brasileira de Metais,* v. 6, Jan. 1950, p. 13-25.

Data indicate that the cause of this defect is the presence of the eutectic Cu-Cu_2O which is localized in the upper part of the billet between the grains of pure Cu. Method of avoiding this defect is indicated. (N12, Cu)

171-N. Carbide Formation During Isothermal Decomposition of Austenite in Chromium Steels. (In Russian.) B. Yu. Mett and R. I. Entin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 72, May 21, 1950, p. 497-500.

Experimentally investigated for three Cr steels having A_3 critical points at 835, 865, and 905° C., respectively. (N8, AY)

172-N. Solid Solubility of Tin in Aluminum. (In Russian.) T. A. Badaeva and R. I. Kuznetsova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 72, May 21, 1950, p. 507-509.

Investigated by determination of microstructure, changes of electric resistance, and lattice parameters. Differential heating curves of alloys annealed at 210° C. were also obtained. (N12, Sn, Al)

173-N. Metastability of Iron-Carbon Alloys. (In Russian.) K. P. Bunin and N. M. Danil'chenko. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 72, June 11, 1950, p. 889-890.

On the basis of theoretical considerations, a solution for the causes of the metastability in Fe-C alloys is proposed. Experimental data confirm the theoretical explanation. (N8, ST)

174-N. The Kinetics of the Zirconium-Nitrogen Reaction at High Temperatures. Andrew Dravnieks. *Journal of the American Chemical Society,* v. 72, Aug. 1950, p. 3568-3571.

The reaction was investigated from 362 to 1043° C. and from 10

to 300 mm. N_2 pressure. Data and apparatus. (N15, Zr, N)

175-N. Microscopic Observation of the Solidification of Small Metal Droplets. D. Turnbull and R. E. Cech. *Journal of Applied Physics,* v. 21, Aug. 1950, p. 804-810.

Experimental procedure and results for a variety of metals. Effect of type of atmosphere. 11 ref. (N12, M26)

176-N. Order-Disorder in Hexagonal Lattices. (In English.) R. M. F. Houtappel. *Physica,* v. 16, May 1950, p. 425-455.

Some relations for the partition functions of two-dimensional infinite triangular and honey-comb lattices with Ising interaction between neighbors without a magnetic field, for the general case of different interactions in the three directions. Exact evaluation of these partition functions is obtained with the aid of the method of Bruria Kaufman. Some thermodynamic properties of the isotropic hexagonal lattices are compared with corresponding properties of the quadratic lattice. 12 ref. (N10)

177-N. The Exchange of Magnesium by Lithium or Sodium in Magnesium Plumbide. (In German.) Georg Brauer and Joachim Tiesler. *Zeitschrift für Anorganische Chemie,* v. 262, June 1950, p. 309-318.

Experiments made to determine the solubility of $Na_{15}Pb_4$ in the fluorite lattice of Mg_2Pb gave negative results. 8-10% Li_4Pb is soluble in Mg_2Pb, and even up to 42% Li_4Pb, the X-ray retains its identity. 15 ref. (N12, Mg, Pb, Li, Na)

178-N. Subcritical Graphitization Can be Controlled. B. F. Brown. *Iron Age,* v. 166, Aug. 31, 1950, p. 64-68.

Mechanism of the phenomenon, which is said to be rather common and to be of importance in all applications of carbon steels as stressed members at temperatures above 750° F. A few critical experiments which serve to define quantitatively the principles involved. (N8, CN)

179-N. On the Martensitic Transformation at Temperatures Approaching Absolute Zero. S. A. Kulin and Morris Cohen. *Journal of Metals,* v. 188, Sept. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1139-1143.

Plastic deformation and straight-cooling experiments on 18-8 and 1% C, 20% Ni steels demonstrate that the martensitic transformation proceeds with characteristic rapidity even at temperatures approaching absolute zero. These results indicate that the atom-by-atom growth mechanism for martensite formation is invalid, at least in the alloys studied. 16 ref. (N8, SS, AY)

180-N. Migration of Carbon in Steel Under the Influence of Direct Current. P. Dayal and L. S. Darken. *Journal of Metals,* v. 188, Sept. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1156-1158.

Improved method for study. Electrolytic migration and ordinary diffusion are not necessarily coupled as in the weld method. Extent of migration is determined by combustion analysis for carbon. Equipment is shown schematically. Micrographs show structures at various points. (N1, ST)

181-N. Present Knowledge of Low-Carbon 18-8. H. W. Gillett. *American Society for Testing Materials,* "Symposium on Evaluation Tests for Stainless Steels", Special Technical Publication No. 93, 1950, p. 41-54; discussion, p. 55.

Reviews data from the literature on austenite stability, carbide precipitation, weldability, and corrosion resistance. Effect of grain size, rolling reduction, and C, N_2, Cr, Ni, Cu, Mn, Si, O_2, Mo, and B content. Competence of conventional methods for evaluating sensitization and corrosion-resistance. 46 ref. (N8, R general, K9, SS)

182-N. Diffusion Coefficient of C in α-Iron. C. A. Wert. *Physical Review,* ser. 2, v. 79, Aug. 15, 1950, p. 601-605.

An equation is developed for interstitial diffusion in cubic lattices, using a classical statistical-mechanical treatment. Measurements of carbon in α-iron were made from −35 to 200° C. Combined with earlier data they extend the knowledge of diffusion in this system from 10^{-20} to 10^{-6} sq. cm. per sec. (N1, Fe)

183-N. Thermomagnetic Transformations of Iron-Carbon-Nitrogen Alloys. (In French.) Jacques Pomey, Francois Goutel, Jacques Moulin, and Raymond Coudray. *Comptes Rendus* (France), v. 230, June 19, 1950, p. 2196-2198.

Thermomagnetic study of Fe-C-N alloy wires obtained by gaseous cementation and diffusion revealed reversible transformations of austenite into cementite (Fe_3C), and nitride (Fe_4N). (N8, Fe)

184-N. Electron-Diffraction Study of Cementation of Iron. (In French.) Jean-Jacques Trillat and Shigueo Oketani. *Comptes Rendus* (France), v. 230,

June 19, 1950, p. 2203-2205.

Methods and results of study of mechanism of cementation and formation of Fe_3C. Typical patterns are illustrated. (N8, J28, Fe)

185-N. Influence of Gas Adsorption on Polymorphic Transformations. (In French.) Hubert Forestier and Jean-Pierre Kiehl. *Comptes Rendus* (France), v. 230, June 26, 1950, p. 2288-2290.

Shows that variation of transformation temperature of pulverized solids is a function of the gas present. This variation is related to the phenomenon of surface adsorption on the crystalline lattice. The following transformations were studied: $\alpha \rightarrow \beta$ for Tl and SnO_2; orthogonal to rhombic for KNO_3; orthogonal to hexagonal for $AgNO_3$; and $\alpha \rightarrow \gamma$ for Fe and eutectoid steel (0.8% C). The gases He, H_2, Ne, N_2, A, O_2, CO_2, and air were used. (N6, EG-m)

186-N. Kinetics of Decomposition of Austenite in Iron-Carbon-Nitrogen Alloys. (In French.) Jacques Pomey, Raymond Coudray, and Francois Goutel. *Comptes Rendus* (France), v. 230, June 26, 1950, p. 2298-2300.

Study of the above in Fe-C-N alloys, obtained by gaseous cementation and homogenization of iron wires, showed that N_2 slows down considerably the rate of nucleation of α-Fe and the rate of linear crystallization. The Ar_3 point is also lowered by the action of nitrogen. Practical aspects. (N8, ST)

187-N. Grain Development in Cast Light Alloys. (In French.) Louis Grand. *Revue de l'Aluminium,* v. 27, June 1950, p. 217-225.

Influence of melting and casting conditions on macrographic structure and effect of modifications of this structure on the quality of light-metal castings. Melting and casting temperatures, speed of solidification, and presence of certain elements have an important effect on grain size. Resistance to static stresses, ability to withstand mechanical deformation, machinability, and anodization vary with structure of the metal. (N3, E25, Al)

188-N. Investigation of the Disorder-Order Transformation Order in Cu_3Au Alloy on the Basis of Electrical Fluctuations. (In Russian.) E. Ya. Pumper. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 72, June 21, 1950, p. 1033-1036.

A previously proposed method for investigation of microscopic processes taking place in a metallic conductor by measurement of the level of emf. fluctuations was verified for the Cu_3Au alloy. (N10, Cu, Au)

189-N. $\alpha \rightleftarrows \gamma$ Transformation in the System Iron-Chromium-Manganese. (In Russian.) *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 23, June 1950, p. 566-574.

Results of extensive investigation, using determinations of hardness, microstructure, and thermal expansion. 10 ref. (N8, Fe, Cr, Mn)

190-N. Importance of the Weichelt Diagram in the Production of Pearlite Cast Iron. (In Dutch.) M. Stap. *Metalen,* v. 4, June 1950, p. 201-212.

Use of the Weichelt C-Si diagram in the production control of cast irons. (N8, E25, CI)

191-N. Formation of Edge Fracture in Blackheart Malleable Iron. (In Czech.) Jiri Celeda and Marie Rysava. *Hutnické Listy,* v. 5, June 1950, p. 221-227.

Study of above defect shows that it is caused by occurrence of decarburization during the incubation period of graphitization of the cementite. The principal factor is, therefore, malleabilizability of the iron. All factors increasing the incubation period promote edge fracture, and vice versa. 11 ref. (N8, CI)

192-N. Transformation of Austenite in a Manganese-Molybdenum Steel Deposited as Weld Metal. O. O. Miller, F. C. Kristufek, and R. H. Aborn. *Welding Journal,* v. 29, Sept. 1950, p. 450s-458s.

The isothermal transformation diagram was determined and from it a cooling transformation diagram was derived and correlated with cooling rates in typical weld deposits and in heat treated steel plate. Supplementary data comprise the hardness and microstructure of an end-quenched hardenability bar, Ae_3 and Ae_1 temperatures, and calculated Ms temperature. 16 ref. (N8, AY)

193-N. The Thermodynamics and Kinetics of Precipitation in Solid Solutions. H. K. Hardy. *Journal of the Institute of Metals,* v. 77, July 1950, p. 457-488.

Factors governing diffusion, fluctuations, and nucleation are briefly outlined to show the manner in which the precipitation process is controlled by free energy/composition and free energy/structure relationships. 40 ref. (N7, P12)

194-N. Physics Above 20,000 Kg./Cm.^{2}. P. W. Bridgman. *Proceedings of the Royal Society,* ser. A, Sept. 7, 1950, p. 1-17.

Pressures up to the general order of 20,000 kg. per sq. cm. may be obtained and their effects measured in vessels made of single blocks of the best grades of steel. The absolute limit for such apparatus has been found to be something less than 30,000 kg. per sq. cm. To reach higher pressures some different principle of construction must be employed. Apparatus is described for producing pressures of 30,000, 50,000, and 100,000 kg. per sq. cm. Behavior of metals, nonmetallic solids, liquids, and gases at these pressures, including changes of state and phase, electrical resistance, etc. (N general, P general)

195-N. Ring Diffusion in Metals. (In English.) Clarence Zener. *Acta Crystallographica,* v. 3, Sept. 1950, p. 346-354.

Diffusion by direct interchange is only a special case of diffusion by the synchronized cyclic motion of a number of atoms, called ring diffusion. Arguments demonstrating that a 4-ring has a lower potential-energy barrier for cyclic motion than has a 2-ring, which corresponds to direct interchange. Detailed calculations for the particular case of self-diffusion in copper. Concludes that such ring diffusion is not excluded by energy considerations. 15 ref. (N1, Cu)

196-N. On the Theory of Diffusion in Metals. (In English.) Frederick Seitz. *Acta Crystallographica,* v. 3, Sept. 1950, p. 355-363.

Zener has generalized the interchange mechanism of metallic diffusion by considering interchange processes in which more than two atoms may change places at once. (See preceding abstract.) Taken as a whole, the theoretical and experimental evidence supports the vacancy mechanism previously postulated. 27 ref. (N1)

197-N. Recent Work on Recrystallization From the School of R. F. Mehl, Pittsburgh, U. S. A. (In German.) Kurt Lücke. *Zeitschrift für Metallkunde,* v. 41, Apr. 1950, p. 114-124.

A critical report. Direct and indirect methods of determining number of nuclei and their linear growth rate from recrystallized structure. Theoretical and experimental data from the literature. 10 ref. (N5)

198-N. Transformation Kinetics of Steels. Composition of the Reactants in the Transformation of a Chromium-Manganese Steel Into the Pearlite Phase. (In German.) Franz Wever and Walter Koch. *Archiv für das Eisenhüttenwesen,* v. 21, May-June 1950, p. 143-152.

An attempt to apply Klinger and Koch's electrolytic process for isolating carbides. Results disclose formation of carbides of very different Cr and Mn contents and two different crystal structures. 13 ref. (N8, AY)

199-N. Transformation Processes as Causes of Cracking in Deeply Carburized Pieces of Steel. (In German.) Fritz Brühl and Hans-Joachim Wiester. *Archiv für das Eisenhüttenwesen,* v. 21, May-June 1950, p. 159-163.

Experimental study of two low-alloy steels showed that cracking can be explained by the fact that the carburized surface is transformed, upon cooling, into pearlite; while the core is transformed into the intermediate or martensitic stage. This results in strong expansion and transformation stresses within the core which cannot be "absorbed" by the greatly reduced plasticity of the surface zone. Methods of minimizing this undesirable tendency. (N8, J28, AY)

200-N. The Diffusion of Silver Into Gold. (In German.) H. Ebert and G. Trommsdorf. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 54, July 1950, p. 294-296.

Method used to determine the effect of temperature on diffusion rate. 12 ref. (N1, Ag, Au)

201-N. Contribution to the Problem of Formation of Martensite Nuclei. (In Russian.) G. N. Kurdyumov and O. P. Maksimova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, July 1, 1950, p. 95-98.

On the basis of theoretical considerations, a series of formulas is proposed to describe the kinetics of formation of martensite nuclei, and the dependence of this phenomenon on temperature and time. (N8, ST)

202-N. Growth of Silver Filaments and Dendrites. Chester R. Berry. *Journal of the Optical Society of America,* v. 40, Sept. 1950, p. 615-617.

Filaments and dendrites of silver were formed by transfer of silver through a layer of silver halide in contact with a silver block at about 400° C. According to the scheme proposed, silver dissolves in the silver halide and migrates as interstitial ions, transfer occurring because of existence of a concentration gradient. At the same time vacant anion sites are formed at the interface permitting migration of halide ions toward the silver block. (N12, Ag)

203-N. Recovery and Cold Working of 52S Commercial Aluminum Alloy.

Gerard H. Boss. *American Society for Metals,* Preprint No. 6, 1950, 20 pages.

Results of experiments on recovery and recrystallization. In order to explain some of the results, it is postulated that there is an intrinsic difference between the modes of deformation during rolling and stretching. Deformation during rolling occurs mainly by fragmentation of crystals so that continuity of the crystal is broken, and during stretching many planes are bent but not broken, resulting in no marked discontinuity. 12 ref.
(N4, N5, Q24, Al)

204-N. Transformations in Ferritic Chromium Steels Between 1100 and 1500° F. (595 and 815° C.). F. J. Shortsleeve and M. E. Nicholson. *American Society for Metals,* Preprint No. 10, 1950, 15 pages.

An X-ray diffraction study was made of the ferrite/ferrite-plus-sigma phase boundary on the Fe side of the Fe-Cr diagram and of the characteristics of sigma formation in Fe-Cr alloys of simulated commercial purity. Effects of Si and Mn additions. (N8, AY)

205-N. Hardening of High-Chromium Steels by Sigma Phase Formation. John J. Gilman. *American Society for Metals,* Preprint No. 11, 1950, 27 pages.

For four high-Cr austenitic-ferritic steels. Effects of composition, temperature, initial ferrite content, cold working, annealing, rolling temperature, casting method, cast vs. wrought material, and recrystallization. 13 ref. (N8, SS)

206-N. Sigma-Phase Formation in a Wrought Heat Resisting Steel. Ahmed El Bindari, P. K. Koh, and Otto Zmeskal. *American Society for Metals,* Preprint No. 13, 1950, 11 pages.

As brought on in stainless steel with Cb and Ti additions. Effects of annealing and strain hardening. (N8, SS, SG-h)

207-N. Formation of Austenite in High-Chromium Stainless Steels. C. B. Post and W. S. Eberly. *American Society for Metals,* Preprint No. 14, 1950, 14 pages.

Commercial alloys contain austenite at high temperatures due to the presence of C, Mn, Si, Ni, and N_2. Method for calculating minimum Cr content to maintain 100% ferrite structure in the presence of these elements. Influence of Cr content and temperature on high-temperature structure. (N8, SS)

208-N. Influence of Austenitizing Time and Temperature on Austenite Grain Size of Steel. O. O. Miller. *American Society for Metals,* Preprint No. 15, 1950, 28 pages.

Data up to 5000 hr. and up to 2300° F. for carbon and low-alloy steels differing in mode of deoxidation, alloy-content, and type of steelmaking process in relation to general phenomena associated with grain growth in metals. 45 ref.
(N3, J22, AY, CN)

209-N. Carbide Precipitation in Type 304 Stainless Steel—An Electron Microscope Study. E. M. Mahla and N. A. Nielsen. *American Society for Metals,* Preprint No. 16, 1950, 25 pages.

Studies were made using a solution of bromine in methanol. Size, form, and distribution of the carbide precipitates, identified as $Cr_{23}C_6$ by electron diffraction analysis, were studied with reference to the time and temperature of heat treatment and effect of 80% cold reduction. 12 ref. (N8, M21, SS)

210-N. Some Aspects of Graphitization in Steel. G. V. Smith, J. A. MacMillan, and E. J. Dulis. *American Society for Metals,* Preprint No. 17, 1950, 20 pages.

Effect of aluminum deoxidation. The nucleation aspect of the problem including effect of heat treating atmosphere. Results with alloy steels. (N8, AY)

211-N. The Determination of Solidus Temperatures in Magnesium Alloys by Dilatometric Measurements. Heinrich Adenstedt and Jay R. Burns. *American Society for Metals,* Preprint No. 28, 1950, 14 pages.

Feasibility of the method for measuring solvus and solidus temperatures. Results are presented and discussed for Mg-Al (4-13%) and Mg-Zn (4-10%) alloys. (N12, Mg)

212-N. Effect of Pressure on Solid Solubility. *Metal Progress,* v. 58, Oct. 1950, p. 554-555. Translated and condensed from "Change in Terminal Solid Solubility of Metals Under Hydrostatic Pressure", M. I. Zakharova.

Previously abstracted from *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR); see item 4C-161, 1949.
(N12, Cu, Al)

213-N. Precementitic Carbides in Tempered Martensite. Earl C. Roberts. *Journal of Metals,* v. 188, Oct. 1950, p. 1210.

Research in progress indicates that the initial carbide should be regarded, not as a stepping stone to cementite precipitation, but rather as a distinct phase having a greater rate of nucleation and growth than cementite. (N2, N8, ST)

214-N. Source of Abnormality in Hypereutectoid Steels. Arthur Dube.

Journal of Metals, v. 188, Oct. 1950, p. 1211.

Proposed explanation for structural abnormality, substantiated by preliminary experiments. (N8, ST)

215-N. On the (259)γ Habit of Martensite. Eugene S. Machlin. *Journal of Metals,* v. 188, Oct. 1950, p. 1212.

Measurements were made of the non-diagonal components of the martensite-transformation strain matrix using single crystals of a 70% Fe, 30% Ni alloy. Habit planes associated with each strain matrix were determined simultaneously, and were found to belong closely to the above family. Conclusions of matrix method of analysis are summarized. (N8, Fe)

216-N. Effect of Uniaxial Compressive Stresses on Self-Diffusion in Alpha Iron. F. S. Buffington. *Journal of Metals,* v. 188, Oct. 1950, p. 1213.

Procedure which utilizes radioactive Fe. (N1, Fe)

217-N. On the Temperature Dependence of Self-Diffusion in Alpha Iron. I. D. Bakalar. *Journal of Metals,* v. 188, Oct. 1950, p. 1213.

Results of research in progress. (N1, Fe)

218-N. Annealing Texture in Rolled Aluminum Strip. Paul A. Beck and Hsun Hu. *Journal of Metals,* v. 188, Oct. 1950, p. 1215-1216.

Shown by pole-figured diagrams. Results are analyzed in terms of orientation and recrystallization phenomena. (N5, Al)

219-N. Order-Disorder Phase Change in Cu_3Au Alloys. F. N. Rhines. *Journal of Metals,* v. 188, Oct. 1950, p. 1216.

Order-disorder change and its reverse were followed by electrical resistivity measurements in Cu-Au alloys containing from about 20 to 32 atomic % Au. (N10, Cu, Au)

220-N. Measurements on the Rate of Secondary Recrystallization in High Purity Silver. F. D. Rosi and B. H. Alexander. *Journal of Metals,* v. 188, Oct. 1950, p. 1217.

Results of research in progress. (N5, Ag)

221-N. Interfaces in Diffusion in Solid Solutions. L. C. C. da Silva and R. F. Mehl. *Journal of Metals,* v. 188, Oct. 1950, p. 1219-1220.

Experimental study of the movement of markers during diffusion in solid solutions. Six systems were investigated at a series of temperatures: Cu/α brass; Cu/Sn-α solid solution; Cu/Al-α solid solution; Cu/Ni; Ag/Au; Cu/Au diffusion couples made by welding. Markers of many types were used, including W, Mo, Ni, and Pt wires; Pt, Ta, W, Fe, and Ni foils; and C, Al_2O_3, and Fe_2O_3 powders. (N1)

222-N. The Isothermal Transformation of a Eutectoid Beryllium Bronze. Ronald H. Fillnow and David J. Mack. *Journal of Metals,* v. 188, Oct. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1229-1236.

Above the nose of the T-T-T curve the first product is fine lamellar pearlite, which subsequently transforms to a coarse pearlite, also by nucleation and growth. At lower temperatures, this coarse pearlite forms directly from beta. Numerous metastable structures are formed before the pearlite reactions begin. The transformation was followed by metallographic, microhardness, and X-ray methods. (N9, Cu)

223-N. Hydrogen Solubility in Aluminum and Some Aluminum Alloys. W. R. Opie and N. J. Grant. *Journal of Metals,* v. 188, Oct. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1237-1241.

Investigation was undertaken to check results reported for pure Al and to show the effect of Si and Cu on amount of H_2 contained by molten alloys. Apparatus and data. (N14, Al)

224-N. Solid Solubility of Cementite in Alpha Iron. Charles A. Wert. *Journal of Metals,* v. 188, Oct. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1242-1244.

By the use of the internal friction of carbon in α-iron, the solubility of cementite was measured down to 150° C. Yield strength of ingot iron containing small amounts of cementite was also determined as a function of carbon concentration. (N12, Q23, ST)

225-N. Ordering Reaction in Cobalt-Platinum Alloys. J. B. Newkirk, A. H. Geisler, D. L. Martin, and R. Smoluchowski. *Journal of Metals,* v. 188, Oct. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1249-1260.

The order-disorder phenomenon in alloys near CoPt composition was studied. Changes in hardness, electrical resistance, X-ray diffraction, and microstructure which accompany the transformation at various temperatures were found to be similar to those characteristic of conventional heterogeneous-precipitation reactions. The transformation

is discussed in terms of our distinct processes which can appear during the ordering reaction. 25 ref. (N10, Co, Pt, SG-n)

226-N. Dendritic Crystallization of Alloys. B. H. Alexander and F. N. Rhines. *Journal of Metals,* v. 188, Oct. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1267-1273.

Aim of the research was to determine the effect of various factors upon mode of formation of dendrites in alloys by measurements of distance between adjacent dendrite arms (dendrite spacing). The work was conducted on a wide variety of binary nonferrous alloys. For each binary pair, composition was varied over a wide range. 14 ref. (N12, EG-a)

227-N. Aging Characteristics of Magnesium-Lithium Base Alloys. P. D. Frost, J. G. Kura, and L. W. Eastwood. *Journal of Metals,* v. 188, Oct. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1277-1282.

Although Mg-Li base alloys have several desirable properties, they also possess certain undesirable characteristics, one of which is the tendency to over-age at 150-200° F. Recently developed alloys possess stability of properties at 200° F. nearly equal to that of commercial Mg alloys. Data include stress-corrosion resistance in an industrial atmosphere, formability, and tensile properties. (N7, Q27, R1, Mg)

228-N. Order-Disorder for Coulomb Forces. J. H. Van Santan. *Philips Research Reports,* v. 5, Aug. 1950, p. 282-287.

According to order-disorder theories based on nearest-neighbor interaction, only a small amount of short-range order remains above the critical temperature at which long-range order is destroyed. From experimental facts (e.g., melting and order-disorder phenomena in ferrites) it is concluded that, in the case of Coulomb interaction, a much larger amount of short-range order and a correspondingly larger energy of order persists above the critical temperature. (N10)

229-N. Self-Diffusion in Cobalt. Foster C. Nix and Frank E. Jaumot, Jr. *Physical Review,* ser. 2, v. 80, Oct. 1, 1950, p. 119.

Radioactive Co^{60}, was used as a tracer element in the study of self-diffusion. (N1, Co)

230-N. The Diffusion Rates of Some Metals in Copper, Silver, and Gold. O. Kubaschewski. *Transactions of the Faraday Society,* v. 46, Sept. 1950, p. 713-722.

Diffusion rates of Zn, Cd, and Ag in Cu at 710-860° C. and of Ag in Au at 800-1000° C. were determined by a method which permitted application of Stefan and Kawalki's tables. Literature concerning diffusion rates of Ni, Pb, Pt, Cu, Ag, Au, Zn and Cd in Cu, Ag, and Au is reviewed, and the most probable constants of Arrhenius' equation for each system are derived. 42 ref. (N1, Cu, Ag, Au)

231-N. Study of the Reaction Between Nitrogen and Titanium Carbide. (In Russian.) A. N. Zelikman and N. N. Gorovits. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 23, July 1950, p. 689-695.

Nitration of TiC in the range 1300-1800° C. was investigated at subatmospheric pressures. It was found that degree of nitration decreases with increasing temperature at a given pressure. Method of investigation and data. 11 ref. (N1, Ti, C-n, N)

232-N. Application of a System of "Network Units" to Isothermal Transformation Curves. (In Portuguese.) Luiz C. Correa da Silva. *Boletim da Associacao Brasileira de Metais,* v. 6, Apr. 1950, p. 77-85.

On the basis of a relation between coefficient of diffusion of carbon in austenite and the mean frequency of carbon-atomic transfer in the network of the same phase, a new unit is proposed which permits elimination of the effect of variation of coefficient of diffusion and temperature. (N8, N1, ST)

233-N. General Discussion of Reactions of Metals in the Solid State. (In Portuguese.) Luiz C. Correa da Silva. *Boletim da Associaçao Brasileira de Metais,* v. 6, Apr. 1950, p. 179-192.

Basic principles. Main factors which influence these reactions. (N general)

234-N. Nucleation Phenomena During Transformation of Steels. (In French.) P. Laurent. *Centre de Documentation Sidérurgique* (Paris), "Semaine d'Etudes de la Physique des Métaux", June 1948, p. 5-18. (N2, N8, ST)

235-N. Decomposition of Austenite Under Isothermal Conditions and Application of This Reaction to the Treatment of Steels. (In French.) A. Sourdillon. *Centre de Documentation Sidérurgique* (Paris), "Semaine d'Etudes de la Physique des Métaux", June 1948, p. 19-38.

Analyzes transformation on the

basis of literature data and the author's work. 38 ref. (N8, J26, ST)

236-N. Contribution to the Theory of Martensite Transformations. (In French.) Ch. Crussard. *Centre de Documentation Sidérurgique* (Paris). "Semaine d'Etudes de la Physique des Métaux", June 1948, p. 39-53.

A critical analysis of theories. The nature and role of internal stresses and their quantitative evaluation as inhibitors of transformation. 40 ref. (N8)

237-N. General Outline of Austenite Decomposition. (In French.) H. Jolivet. *Centre de Documentation Sidérurgique* (Paris), "Semaine d'Etudes de la Physique des Métaux", June 1948, p. 67-74.

Experimental and theoretical methods for investigation. The principal results are critically analyzed. (N8, ST)

238-N. (Book) **Semaine d'Etudes de la Physique des Métaux.** (Symposium on the Physics of Metals.) 99 pages. June 1948. L'Institut de Recherches de la Sidérurgie, Centre de Documentation Sidérurgique, 12 rue de Madrid, Paris 8, France. 500 fr.

Consists of seven review papers (abstracted separately) on transformations and heat treatments of steels and light alloys. (N8, J26, J23, ST, Al)

239-N. Mode of Transition From Hägg Iron Carbide to Cementite. E. M. Cohn and L. J. E. Hofer. *Journal of the American Chemical Society,* v. 72, Oct. 1950, p. 4662-4664.

The reaction of Hägg carbide, Fe_2C, to yield cementite, Fe_3C, and free carbon was found to be a discontinuous (or heterogeneous) precipitation. Hägg carbide and cementite have narrow ranges of composition and apparently do not form intermediate metastable solid solutions. The "unstable" or "labile" carbide of Kolbel and co-workers is believed simply Hägg carbide. 10 ref. (N8, ST)

240-N. Formation of Crystal Nuclei in Liquid Metals. D. Turnbull. *Journal of Applied Physics,* v. 21, Oct. 1950, p. 1022-1028.

The known facts about nucleation phenomena in liquid metals are interpreted satisfactorily on the basis of critical-size and interfacial-energy concepts. In large continuous masses, nucleation is almost always catalyzed by extraneous interfaces. However, in very small droplets, the probability that a catalytic inclusion is present is so much less that their minimum nucleation frequencies are reproducible and form a consistent set of values. Interfacial energies between crystal nuclei and corresponding liquids were calculated from nucleation frequencies of small droplets on the basis of the theory of homogeneous nucleation. Energies of interfaces one atom thick and containing N atoms were calculated. Effect of relative complexity of crystal structure upon supercooling behavior of pure metals apparently is a reflection of its effect upon atomic heat of fusion. 25 ref. (N2, P10)

241-N. Allotropy of Beryllium. S. S. Sidhu and C. O. Henry. *Journal of Applied Physics,* v. 21, Oct. 1950, p. 1036-1037.

The allotropy of Be was confirmed by employing different alloying properties of allotropic forms of metallic elements. Alloys of Be and Au, studied by X-ray diffraction methods, showed that the limit of solubility of Au in Be is between 2 and 3 atomic % and that practically all of it is dissolved in the β-form. Lattice parameters of the two forms observed are given. (N6, Be, Au)

242-N. Local Order in Solid Cu_3Au. R. A. Oriani. *Journal of Applied Physics,* v. 21, Oct. 1950, p. 1068-1069.

Recent X-ray data by Cowley at temperatures above the critical temperature of superlattice formation enable the degree of local order computed from X-ray measurements to be compared with that calculated from thermodynamic activity coefficients measured by Weibke and Quad. Briefly summarizes calculations of local order at the composition Cu_3Au at 500° C., over 100° higher than the critical temperature of superlattice formation. (N10, Cu, Au)

243-N. Formation of Annealing Twins During Grain Growth. R. L. Fullman. *Journal of Applied Physics,* v. 21, Oct. 1950, p. 1069-1070.

Suggests that an annealing twin forms in the corner of a growing grain when the orientation relationships between the twin and the grain's neighbors lead to a smaller total interfacial free energy than do the orientation relationships between the grain itself and its neighbors. A twin boundary then forms in a corner of the grain, and the grain continues to grow as a twin of the original crystal. (N3)

244-N. Deformation and Recrystallization of Alloys Containing Two Phases. L. M. Clarebrough. *Australian Journal of Scientific Research,* ser. A, v. 3, Mar. 1950, p. 72-90.

Using mainly Ag-Mg alloys, deformation of the phases was determined from observations of slip lines

and recrystallization behavior. Relative deformation of the two phases is influenced both by total deformation of the alloy and by volume fractions of the phases. Recrystallization behavior in a duplex alloy is affected by the state of order of the phases, and by precipitation occurring in one of the phases on annealing the deformed alloy. Brasses and an 80-20 Cu-Fe alloy were also studied. (N5, Q24, Ag, Mg, Cu)

245-N. Self-Diffusion in Tin Crystals. P. J. Fensham. *Australian Journal of Scientific Research,* ser. A, v. 3, Mar. 1950, p. 91-104.

Rate of self-diffusion in single crystals of white Sn of various orientations was measured using the radioactive isotope Sn^{113}. Anisotropy is discussed in terms of the vacancy mechanism of diffusion. (N1, Sn)

246-N. Self-Diffusion in Polycrystalline Tin. P. J. Fensham. *Australian Journal of Scientific Research,* ser. A, v. 3, Mar. 1950, p. 105-108.

Rate of volume diffusion, indicated by darkening of photographic films, is in general agreement with previous measurements of rate of self-diffusion in different crystallographic directions. Rate of diffusion along grain boundaries is generally considerably higher than that of volume diffusion except when the boundary is between twins or between crystals of similar orientations. Observations are discussed in terms of recent theories. 10 ref. (N1, Sn)

247-N. Problems of the Heat Resistance of Alloys. (In Russian.) I. Dekhtyar. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, July 11, 1950, p. 303-305.

Analyzed on the basis of electronic theory. Investigation of diffusion in alloys indicates that its probable mechanism is filling of vacancy centers in the lattice by the diffusing atoms. If this is the case, it is of fundamental importance to the mechanism of creep. 11 ref. (N1, Q3, SG-h)

248-N. Concerning the Transformation of Deformed Austenite Into Martensite. (In Russian.) G. V. Kurdyumov, O. P. Maksimova, and T. V. Tagunova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, July 11, 1950, p. 307-310.

Influence of austenite deformation on the kinetics of austenite transformation into martensite during subsequent cooling and, in particular, on rate of isothermal transformation and its temperature dependence, was investigated, using a ferrous alloy containing 23% Ni and 3.4% Mn. 10 ref. (N8, AY)

249-N. "Coagulation" and Decomposition of Carbides (Graphitization) During Annealing of Silicon Steel. (In Russian.) S. Z. Bokshtein. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, July 11, 1950, p. 311-314.

Investigated for 0.4% C steels containing 0.25, 1.75, and 2.75% Si, quenched from 930 and 980° C., and annealed at 700° C. for 10 min. to 25 hr. Results are discussed from the point of view of their application to explanation of the mechanism of graphitization. (N8, J23, AY)

250-N. Influence of Alloying Elements on Decomposition of Martensite During Annealing of Steel. (In Russian.) S. Z. Bokshtein. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, July 21, 1950, p. 491-494.

Investigated on medium-carbon steel with addition of one of the following elements—Ni, Mn, Cr, Mo, V, or Si—after annealing between 200 and 650° C. for 1 min. to 25 hr. 10 ref. (N8, J23, AY)

251-N. Continuous Solid Solutions of Metals of the Transition Group of Mendeleev's Periodic System of the Elements. (In Russian.) I. I. Kornilov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, July 21, 1950, p. 495-497.

Possibility of predicting the solid solubility ranges of binary combinations of the various elements found in the 8th group of the periodic table, on the basis of known values for the binary solutions with Fe and values for atomic diameters of the different elements. Includes table for the various combinations. (N12)

252-N. Problems in the Study of the Initial Stages of Melting of Complex Metal Systems. (In Russian.) N. T. Gudtsov and M. G. Lozinskii. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, Aug. 1, 1950, p. 689-692.

Experiments on vacuum melting of an alloy steel (0.12% C, 1.0% Mo, 2.5% Co, 1.2% Cb, 0.7% Mn, and 0.8% Si) at temperatures up to 1300-1350° C., pressure of 10^{-5} mm. Hg, and heating rates of 100° C. per min. Diagram shows special apparatus developed for the purpose. For the first time, individual foci of austenitic grain melting were revealed. (N12, D8, AY)

253-N. Diffusion Processes in Metals. (In Czech.) Vl. Sedlacek. *Hutnické Listy,* v. 5, July 1950, p. 277-286.

Fundamental theory and individual types of diffusion. An empirically deduced relation for depth of the diffusion layer and relation of diffusion coefficient to temperature. The diffusion processes are divided into four basic types, namely Schottky, Frenkel, position-exchange, and channel diffusion; these particular types are discussed with respect to internal structure of the material. From analysis of theoretical equations, assumptions are made regarding influence of various factors, especially that of pressure, on diffusion coefficient. (N1)

254-N. Hydrogen Elimination by Aging. C. E. Sims. *Journal of Metals,* v. 188, Nov. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1321.

On the basis of experience with accelerated aging of 1 and 4-in. cast steel coupons and room temperature aging of 1-in. coupons, it was predicted that, some time after two years and when the hydrogen content has been reduced to about 0.10 relative volume, there would be some recovery of ductility. Experimental data show, by extrapolation from 555 days, that about 6 years would be required at room temperature for complete recovery of ductility at the center of 4-in. coupons. (N7, Q23, CI)

255-N. The Formation of Annealing Twins. J. E. Burke. *Journal of Metals,* v. 188, Nov. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1324-1328.

Critical discussion and analysis of literature. Three conditions which must be fulfilled for growth of annealing twins. Although they are prominent only in recrystallized metals, deformation is not necessary to produce them. Rather, they may form whenever a grain boundary migrates. 12 ref. (N5)

256-N. Transformation Characteristics of a Lithium-Magnesium Alloy. C. S. Barrett and D. F. Clifton. *Journal of Metals,* v. 188, Nov. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1329-1332.

The martensite-type transformation curves for a 12.4 atomic % Li Mg-base alloy were investigated by X-ray spectrometer methods. Critical temperatures for formation and decomposition of the low-temperature phase; influence of previous thermal and mechanical history. (N9, Mg)

257-N. A Special Case of Carbon Diffusion: From Cast Iron to Cast-In Steel. (In English.) J. E. de Graaf. "International Gieterij Congres 1949—Amsterdam", p. 106-117; discussion, p. 117.

Microstructures and governing factors. Solubility of carbon in homogeneous solution at the temperature of strong diffusion is the main factor. The diffusion coefficient seems to play a minor role. (N1, CI)

258-N. Anomalies of Segregation in Super-Cooled Binary Melts, Especially the So-Called Formation of Halos. (In German.) Adelheid Kofler. *Zeitschrift für Metallkunde,* v. 41, Aug. 1950, p. 221-226.

A review of literature. Compares observations on nucleus formation in organic compounds with a similar phenomenon in metals. Binary phase diagrams show the regions of "halo" formation for typical cases. (N12)

259-N. Crystallization of Copper in Contact With Mercury. (In German.) Erwin W. Muller, Iwan N. Stranski, and Eugen Szabo de Bucs. *Zeitschrift für Metallkunde,* v. 41, Aug. 1950, p. 226-227.

Studies made to explain the change in crystallization of Cu caused by contact with Hg. Experiments showed that temperature and previous heat treatment have a profound effect on this phenomenon. (N12, Cu)

260-N. Alloys of Gold With Cobalt and Iron. (In German.) Ernst Raub and Paul Walter. *Zeitschrift für Metallkunde,* v. 41, Aug. 1950, p. 234-238.

Reviews literature on phase relationships and transformations of Au-Co and Au-Fe systems, their respective limits of saturation, melting points, transformation temperatures, heat-cooling curves, and lattice constants. 15 ref. (N9, M24, Au, Co, Fe)

261-N. The Age Hardening of Iron-Gold Alloys. (In German.) Werner Köster and Eberhard Braun. *Zeitschrift für Metallkunde,* v. 41, Aug. 1950, p. 238-240.

Mechanical and magnetic age hardening of an Fe-Au alloy (10% Au) in the range 400-700° C. were studied. Activation energy of the

process was about 72,000 cal. per mol., while that of the age hardening of Fe by means of Cu is about 33,000 cal. per mol. (N7, Fe)

262-N. The AuCu Transformation in Ternary Alloys. (In German.) Ernst Raub and Paul Walter. *Zeitschrift für Metallkunde,* v. 41, Aug. 1950, p. 240-243.

Reviews the literature dealing with the effect of Ag and of Ni on the transformation. Effects of Cd, Ti, Mg, Al, and Mn were studied. 12 ref. (N9, Au, Cu)

263-N. Experiments on the Effect of Hydrogen on Grain Growth in Magnesium and Magnesium Alloys. (In German.) Walter Mannchen. *Zeitschrift für Metallkunde,* v. 41, Aug. 1950, p. 255-260.

Shows that the grain-refining effect of Ca and other hydride-forming elements is due to the presence of traces of H_2—proved by the fact that the introduction of gaseous H_2 into the melt has the same effect. Addition of Cl is effective only when it is followed by addition of H_2. Tabulated data and macrographs. (N3, Mg, H)

264-N. Physical Principles of Diffusion in Metals. (In French.) P. Laurent. *Métaux et Corrosion,* v. 25, July-Aug. 1950, p. 172-187.

A comprehensive review on the basis of the literature and the author's experiences. Theoretical aspects, such as general equations of diffusion, are analyzed. 21 ref. (N1)

265-N. Probable Mechanism of Martensite Dissociation (In Russian.) Yu. A. Bagaryatskii. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, Aug. 21, 1950, p. 1161-1164.

The relationship between martensite and cementite structures and the possible mechanism of their rearrangement was theoretically studied. Postulates that, for low-temperature annealing, the transformation consists of: "twinning" of the martensite lattice along the (121) planes; displacement of atoms towards the "twinning" planes; and a certain warping of the atomic planes caused by the C atom displacement. These processes do not require displacement of Fe atoms. 10 ref. (N8, ST)

266-N. Kinetics of Polymorphous Transformation of Alloys of Iron. (In Russian.) L. I. Kogan and R. I. Entin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, Aug. 21, 1950, p. 1173-1176.

Results of a study of the γ-α transformation of Fe alloyed with Cr + Ni, Cr, Ni + Mo, and Cr + Co. Influences of alloying elements on displacement of critical points, formation of nuclei, and the energies of "activation" were investigated. (N8, Fe)

267-N. Annealing of Twinned Crystals of Iron. (In Russian.) R. I. Garber, I. A. Gindin, M. G. Konstantinovskii, and V. I. Startsev. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Sept. 11, 1950, p. 343-344.

Investigation showed complete analogy of twinning in iron to the previously demonstrated phenomenon in sodium nitrate: thin wedge-shaped twins are easily eliminated by subsequent annealing. Test apparatus and photomicrographs. (N5, Q24, Fe)

268-N. Frequency Factor and Activation Energy for the Volume Diffusion of Metals. G. J. Dienes. *Journal of Applied Physics,* v. 21, Nov. 1950, p. 1189-1192.

Mathematical analysis and correlation of experimental data for various binary systems. 17 ref. (N1)

269-N. Measurements on the Diffusion of Interstitial Atoms in B.C.C. Lattices. C. A. Wert. *Journal of Applied Physics,* v. 21, Nov. 1950, p. 1196-1197.

Alloys of interstitial dissolved atoms in b.c.c. lattices offer the possibility that one can make extremely accurate measurements of the rate of diffusion of the solute atoms. Diffusion of C in α-Fe offers an example of this technique. Measurements of diffusion of C in Ta and Cb and of N in α-Fe. (N1)

270-N. Effect of Phase Changes Below the A_1 Point on the Properties of Commercial Iron. (In German.) Werner Köster. *Archiv für das Eisenhüttenwesen,* v. 21, Sept.-Oct. 1950, p. 305-314.

Miscellaneous property changes in the above temperature range are the result, primarily, of the reduced solubility of carbon and nitrogen in α-Fe. Experiments showed that age hardening is caused by the precipitation of finely dispersed cementite. 60 ref.
(N8, N7, P general, Q general, Fe)

271-N. Crystal Structures and Transformations in Indium-Thallium Solid Solutions. Lester Guttman. *Journal of Metals,* v. 188, Dec. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1472-1477.

X-ray diffraction and metallo-

graphic studies of the In-Tl system showed existence of a transformation from face-centered tetragonal to face-centered cubic in In-rich solutions. The equilibrium diagram was revised to conform with these measurements and published thermal data. Range covered was 0-75 atomic % Tl. 13 ref.
(N9, M24, In, Tl)

272-N. Crystallography of Cubic-Tetragonal Transformation in the Indium-Thallium System. J. S. Bowles, C. S. Barrett, and L. Guttman. *Journal of Metals,* v. 188, Dec. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1478-1485.

The diffusionless transformation from cubic to tetragonal in In-Tl alloys on cooling was analyzed by metallographic and X-ray measurements. Theories of atom movements are tested by precision pole figures, and it is concluded that the transformation occurs by a double shear process. Appendix gives mathematical proof that the cubic-tetragonal transformation can be accomplished by two shears. 14 ref.
(N9, N1, M24, In, Tl)

273-N. The Mechanism of Self-Diffusion in Alkali Metals. Heinz R. Paneth. *Physical Review,* ser. 2, v. 80, Nov. 15, 1950, p. 708-711.

On the basis of calculations of the activation energies of various ring, vacancy, and interstitial mechanisms in alkali metals, the most probable mechanism of self-diffusion was found to be the rapid transmission of short linear regions of compression along body-diagonals in the body-centered cubic lattice. 11 ref. (N1, EG-e)

274-N. Interpretation of the Diffraction of X-Rays by Alloys Subject to Structural Hardening. (In French.) André Guinier. *Comptes Rendus* (France) v. 231, Oct. 2, 1950, p. 655-657.

Critically analyzes the attempt of Geisler and Hill to provide a general explanation of X-ray diffraction phenomena accompanying the precipitation of a supersaturated solid solution. Data of experimental investigation previously reported by Guinier and by Jacquet and Guinier for an Al-Cu and a Cu-Be alloy, respectively, are said to conflict with the theory of Geisler and Hill. A new interpretation of the X-ray diffraction patterns is proposed.
(N7, M22)

275-N. Studies on the Structure of Hard Chromium Plate. *Journal of the Electrochemical Society,* v. 97, Dec. 1950, p. 466-471.

Discussion of above paper by Cloyd A. Snavely and Charles L. Faust. See item 61-N, 1950. (N5, Cr)

276-N. Investigation of the Initial Stages of Aging in Aluminum Alloys. (In Russian.) N. N. Buinov and R. M. Lerinman. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Oct. 1, 1950, p. 707-710.

Investigated using the electron microscope, on Al-Cu (4% Cu), Al-Ag (10% Ag), and Al-Mg-Si (1.4% Mg_2Si), differently heat treated. Results are in disagreement with X-ray studies of the same specimens with respect to time of inception of dissociation. A tentative explanation is proposed. (N7, Al)

277-N. The Production of Monocrystals of Boron Carbide. (In Russian.) I. L. Zagyanskii, G. V. Samsonov, and N. V. Popova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Oct. 1, 1950, p. 723-724.

An improved method. Boron carbide (B_4C) monocrystals were obtained in sizes up to 10 mm. long and 0.25-0.5 mm. thick. Hardness of these crystals surpasses that of corundum and of carborundum.
(N12, C-n, B)

278-N. Solubility of Nitrogen in Liquid Chromium and in Chromium-Silicon Melts. (In Russian.) V. S. Mozgovoi and A. M. Samarin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Oct. 1, 1950, p. 729-732.

Investigated for commercial-grade Cr (1.04% Fe, 0.6% Al, 0.2% Si, 0.15% N) and Si (0.78% Al, 0.20% Fe, and 0.04% C). Time of contact of the melt with N_2 was 40 min. at 1600-1750° C. It was found that solubility of N_2 decreases with increasing temperature and that an increasing amount of Si in the mixture decreases the solubility of N_2. Data are charted. (N12, Cr, Si)

279-N. Influence of Molybdenum Additions on the Mechanism of Eutectoid Transformation of Austenite. (In Russian.) M. E. Blanter. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Oct. 1, 1950, p. 791-793.

Results of investigation.
(N8, ST, AY)

SECTION P

PHYSICAL PROPERTIES and TEST METHODS

1P. Volume Changes in the Plastic Stages of Simple Compression. P. W. Bridgman. *Journal of Applied Physics,* v. 20, Dec. 1949, p. 1241-1251.

Method by which volume changes occurring during plastic flow in simple compression are directly measured in a dilatometer during the flow process. Advantage of the method over indirect determination from alteration of dimensions is pointed out. Results were obtained for three rocks, quartz crystal, and a number of metals including several grades of steel and iron. (P10, Q23)

2P. The Physical Properties of Titanium. I. Emissivity and Resistivity of the Commercial Metal. Walter C. Michels and Sally Wilford. *Journal of Applied Physics,* v. 20, Dec. 1949, p. 1223-1226.

Measured from room temperature to 1400° K. Spectral emissivity and brightness temperature scale were also determined from 1000 to 1400° K. 11 ref. (P17, P15, Ti)

3P. Structure and Properties of the Permanent Magnet Alloys. Alfred H. Geisler. *Electrical Engineering,* v. 69, Jan. 1950, p. 37-44.

Some structural factors which facilitate an understanding of the effects of composition and heat treatment on the properties of permanent magnet materials. Reactions in solid solutions; properties of solid solutions and mixed phases; eutectoid decomposition; precipitation from solid solution; superlattice formation; origin of permanent magnetism; and magnetic anisotropy. (P16, N general, SG-n)

4P. Vapor Pressure of Titanium. John M. Blocher, Jr., and I. E. Campbell. *Journal of the American Chemical Society,* v. 71, Dec. 1949, p. 4040-4042.

Determined from 1500-1800° K. using the Langmuir technique. The data are used for thermodynamic calculations and compared with results of Carpenter and Reavell. 11 ref. (P12, Ti)

5P. Chart Simplifies Recording of Wire Resistance Data. Joseph T. Hogan. *Chemical Engineering,* v. 56, Dec. 1949, p. 113-114.

Chart gives resistance in ohms per ft. for 17 metals and alloys for wire sizes ranging from Nos. 5-40 B. & S. gage. (P15)

6P. Magnetic Saturation Intensities and Curie Temperatures for Some Industrial Permanent Magnet Materials. L. Ward. *Metallurgia,* v. 41, Nov. 1949, p. 3-7.

The work was undertaken in order to investigate the phase conditions by magnetic analysis of a representative selection of commercial magnetic materials. The investigation has indicated that, in alloys of the Alnico-type, there is a reversible phase up to the Curie point, and that the cobalt steels, as industrially heat treated, contain mixtures of austenitic and magnetic alpha phases. (P16, N8, SG-n)

7P. Some Physical Properties of Aluminium Alloys at Elevated Temperatures. *Metallurgia,* v. 41, Nov. 1949, p. 15-21.

Experimental results for the thermal conductivities, electrical resistivities, and coefficients of linear thermal expansion of nine wrought and ten cast Al alloys, mainly over the range 20-300° C., but in a few instances at higher temperatures. Some of the alloys were given special heat treatments at about 160° C. before testing. Except for a few high-Si alloys, results can be expressed within about 5% by an empirical equation containing the above factors. (P11, P15, Al)

8P. Electrical Resistivity and Thermoelectric Power of Antimony-Selenium Alloys. B. D. Cullity, M. Telkes, and John T. Norton. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Jan. 1950, p 47-52.

The research was initiated in an attempt to find a material for use in thermo-electric generators. Although none of the Sb-Se alloys is suitable for this purpose, the properties of Sb_2Se_3 indicate that it may have applications as a thermistor material. 19 ref. (P15, Sb, SG-q)

9P. Reactions of Zirconium, Titanium, Columbium, and Tantalum With the Gases, Oxygen, Nitrogen, and Hydrogen at Elevated Temperatures. Earl A. Gulbransen and Kenneth F. Andrew. *Journal of the Electrochemical Society,* v. 96, Dec. 1949, p. 364-376.

A systematic study of the kinetics of the above reactions. Data are correlated with fundamental diffusion and solution processes. 36 ref. (P 13, N15, EG-d, EG-m)

10P. Unsymmetrical Hysteresis Loops in a Nickel-Iron Alloy. J. L. Rothery and An Wang. *Nature,* v. 164, Dec. 10, 1949, p. 1004-1005.

Pronounced asymmetry was observed in the dynamic hysteresis loop of one particular sample (a 47-50 Ni-Fe alloy containing 1% Al in the form of a wound-tape strip). The effect was found to a lesser extent in similar Ni-Fe alloys, but not in the usual soft magnetic alloys. (P16, Ni, Fe)

11P. Electronic Specific Heats in Tungsten and Zinc. A. A. Silvidi and J. G. Daunt. *Physical Review,* ser. 2, v. 77, Jan. 1, 1950, p. 125-129.

Calorimetric measurements were made in the liquid-helium temperature region. Results were resolved into lattice T^3 functions and electronic terms. 36 ref. (P12, W, Zn)

12P. An Experimental Investigation of the Electrical Performance of Bolted Aluminum-to-Copper Connections. W. F. Bonwitt. *Transactions of the American Institute of Electrical Engineers,* v. 67, Part II, 1948, p. 1208-1218; discussion, p. 1218-1219.

The feasibility of making direct connections between Al and Cu. Suitable finish for Cu. Effect of using a compound in such connections. (P15, T1, Al, Cu)

13P. Bridge Erosion in Electrical Contacts and Its Prevention. W. G. Pfann. *Transactions of the American Institute of Electrical Engineers,* v. 67, Part II, 1948, p. 1528-1533.

Previously abstracted from condensed version in *Electrical Engineering.* See item 3C-34, 1949. (P15, R1)

14P. The Magnetic Properties of Stainless Steels. William A. Stein. *Transactions of the American Institute of Electrical Engineers,* v. 67, Part II, 1948, p. 1534-1537.

Previously abstracted from condensed version in *Electrical Engineering.* See item 3B-41, 1949. (P16, SS)

15P. Hy-Therm Copper—An Improved Overhead-Line Conductor. L. F. Hickernell, A. A. Jones, and C. J. Snyder. *Transactions of the American Institute of Electrical Engineers,* v. 68, 1949, p. 22-27; discussion, p. 27-30.

Previously abstracted from *Electrical Engineering.* See item 18C-5, 1949. (P15, SG-r, Cu)

16P. Thermo-Electric and Thermodynamic Study of Aluminum Alloys Containing Mg, Si, Fe, and Ti as Alloying Elements. (In French.) C. Crussard and F. Aubertin. *Revue de Métallurgie,* v. 46, Oct. 1949, p. 661-675.

Comprehensive study with emphasis on thermo-electric effects. Such effects are usually proportional to concentration of the alloying element. Anomalies observed in the case of Mg are explained. 12 ref. (P15, P12, Al)

17P. Generalized Mechanism of Coercive Field and of Residual Magnetism of MnBi Powder. (In French.) Charles Guillaud. *Comptes Rendus* (France),

On the basis of obtained data and theoretical considerations, it is shown that the above mechanism is the same as for other ferromagnetic bodies belonging to the hexagonal system for which the axes of easy magnetization are their directional axes. (P16)

18P. Concerning the Variation of the Extrapolated Moment $\mu_{\theta=0}$ of Ferromagnetic Alloys of the Iron Group. (In French.) Pierre Taglang. *Comptes Rendus* (France), v. 229, Nov. 14, 1949, p. 994-995.

The relationship between the above moment and the Curie point was investigated. It was found to be independent of Curie point. (P16, SG-n)

19P. Contacts Used in Electrical Measuring Technique. (In German.) Hansjorg Mackh. *Archiv für Technisches Messen,* Nov. 1949, p. T102-T104 (6 p.).

The various types of contact used; sources of error (such as contact resistance, voltage, and temperature

as well as mechanical disturbances); the proper care of contacts; properties and uses of different contact materials; and special characteristics of different types of contact. 21 ref. (P15, SG-r)

20P. The Reflection and Absorbing Power of the Metals. (Theoretical Remarks on the Measurements of K. Weiss.) (In German.) Eckhart Vogt. *Annalen der Physik,* ser. 6, v. 3, Aug. 1, 1948, p. 82-88.

Critical analysis of Weiss measurements (recent German work) on the absorbing powers of "manganim", copper, and iron for infrared rays. The absorbing power of copper agrees with Drude's metal-electron theory, whereas that of manganim agrees with Hagen-Ruben's theory. In the case of Fe, the steep rise of absorption with decreasing wave length indicates electron transfer of the conduction electrons from the incompletely occupied d-band to the s-band. 16 ref. (P17)

21P. Electrical Properties of Ruthenium. (In German.) E. Justi. *Zeitschrift für Naturforschung,* v. 4a, Sept. 1949, p. 472-474.

Electrical resistances and Hall effects of Ru (99.99% purity) were determined at temperatures ranging from the boiling point of hydrogen to the freezing point of water. 10 ref. (P15, Ru)

22P. Study of Transformations in Austenitic Alloys by a Magnetic Method. (In Russian.) G. V. Estulin. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Oct. 1949, p. 1262-1263.

Method of measuring magnetic properties of certain austenitic steels —Cr-Ni and Cr-Mn-W. (P16, N8, AY)

23P. Investigation of a Cr-Te Alloy. (In Russian.) A. K. Kikoin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 68, Sept. 21, 1949, p. 481-482.

Heat capacity and temperature variation of resistance of an alloy containing 24.3% Cr and 75.7% Te. Method of production of the test specimen and its investigation. A marked anomaly is the heat capacity at 60° C. (P12, P15, Cr, Te)

24P. Electroconductivity of the Ferromagnetic Cr-Te Alloy. (In Russian.) I. G. Fakidov, N. P. Grazhdankina, and A. K. Kikoin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 68, Sept. 21, 1949, p. 491-492.

Investigation of temperature dependence of specific resistance of Cr-Te alloys close to the stoichiometric composition, CrTe; and of influence of magnetic field on resistance. Method of investigation, including technique of alloy preparation. (P15, P16, Cr, Te)

25P. Causes of Passivity of Copper and Iron in the Benzene Hydrogenation Reaction. (In Russian.) M. Ya. Kagan and S. D. Fridman. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 68, Oct. 1, 1949, p. 697-699.

Benzene is not hydrogenated in the presence of Cu and Fe catalysts. Experiments indicate the reason for this behavior, which is in contrast to that of Pt, Pd, and Ni. (P13, Cu, Fe)

26P. Physical Properties of Polonium. I. Melting Point, Electrical Resistance, Density, and Allotropy. Charles R. Maxwell. **II. X-Ray Studies and Crystal Structure.** William H. Beamer and Charles R. Maxwell. **III. The Half-Life of Polonium.** William H. Beamer and William E. Easton. *Journal of Chemical Physics,* v. 17, Dec. 1949, p. 1288-1300.

Part I: Properties and preparation technique. Part II: Technique, atomic-diameter data and information on the Po-Pb alloy system. 22 ref. (P general, M general, Po)

27P. Reactivity of Different Faces of a Copper Single Crystal. P. R. Rowland. *Nature,* v. 164, Dec. 24, 1949, p. 1091-1092.

By using single-crystal metal spheres, Hausser, Tamman, and Satorius, and A. T. Gwathmey and collaborators, have demonstrated marked differences in the physicochemical properties of crystal surfaces of a crystal. Their techniques were extended to reactions in which crystals are etched by vapors under conditions of temperature and pressure such that the product is volatilized away as fast as it is formed. Etch pits produced were examined. Potentialities of the technique. (P13, Cu)

28P. Emissivities of Copper and Aluminum. George Best. *Journal of the Optical Society,* v. 39, Dec. 1949, p. 1009-1011.

Total hemispherical emissivities of Cu and Al were determined from 100 to 400° C. Comparison of the results with those predicted by the theory of Davisson and Weeks shows moderate agreement for Al and disagreement for Cu. (P17, Cu, Al)

29P. Hydrophobic Monolayers Adsorbed From Aqueous Solutions. Elaine G. Shafrin and W. A. Zisman. *Journal*

of Colloid Science, v. 4, Dec. 1949, p. 571-590.

Results of studies on several members of a homologous family of primary amines of the normal alkyl type adsorbed onto platinum surfaces. The method is proposed as a possible approach to the examination of films important in the fields of selective adsorption, mineral flotation, corrosion inhibition, and pickling of metals. 14 ref. (P13)

30P. Ferromagnetic Properties of a Cobalt Monocrystal. (In French.) Charles Guillaud and Madeleine Roux. *Comptes Rendus* (France), v. 229, Nov. 21, 1949, p. 1062-1064.

Curves of magnetization were investigated as a function of internal field at constant temperature; and magnetization at constant field as a function of temperature; also magnetocrystalline energy. (P16, Co)

31P. Macroscopic Magnetic Structure of Permalloy Strips. (In French.) Israel Epelboin and André Marais. *Comptes Rendus* (France), v. 229, Nov. 28, 1949, p. 1131-1133.

Distribution of magnetic permeability according to distance from the surface of solid ferromagnetics and definite relations between this distribution and metal thickness in case of complex ferronickels of the permalloy type (77% Ni, 14% Fe, 5% Cu, 4% Mo), differently heat treated, were investigated. (P16, M28, SG-n)

32P. Investigation of Paramagnetic Susceptibility of Alloys of Transition-Group Metals With Tellurium. (In Russian.) F. M. Gel'perin and T. M. Perekalina. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 69, Nov. 1, 1949, p. 19-22.

Alloys of V, Cr, Co, and Ni with Te were investigated using the apparatus described by Sucksmith and Pearce, crystal structure being determined by an X-ray method. Physical constants and paramagnetic susceptibilities. (P16, Te)

33P. Investigation of Electrocapillary Phenomena for Alloys of Tin With Gold and of Bismuth With Tellurium. (In Russian.) S. Karpachev and E. Rodigina. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry), v. 23, Aug. 1949, p. 953-958.

Investigated for liquid alloys. Sharp minima of surface tension were observed in both alloys. Conditions of existence of maxima and minima of surface tension were analyzed theoretically for interfaces of a bimetallic alloy and its saturated vapor. (P10, Sn, EG-a)

34P. A Kinetic Method of Physicochemical Analysis. II. Kinetics of Catalytic Dissociation of Hydrogen Peroxide on Alloys. (In Russian.) V. A. Shushunov and K. G. Fedyakova. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry), v. 23, Aug. 1949, p. 936-941.

The relation between catalytic activity of certain binary alloys and their composition was investigated. Dissociation of H_2O_2 under catalytic action of pure Bi, Cd, Sb, and Sn and their alloys obeys the law of monomolecular reaction. Energy of activation of dissociation of H_2O_2 on Bi + Sn alloys decreases in a linear manner with increase of concentration of Sn. (P13, Sn, EG-a)

35P. Influence of Tensile Stressing on Magnetic Saturation of Fe-Ni Alloys in the Invar Region. (In Russian.) K. P. Belov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 19, Sept. 1949, p. 1032-1040.

Change of magnetic saturation of alloys close to invar (36% Ni, 64% Fe) in composition and properties was investigated. 18 ref. (P16, SG-s)

36P. Thermal Expansion Near the Melting Point. G. M. Bartenev. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry), v. 23, Sept. 1949, p. 1075-1082.

Theoretical considerations, and a relationship describing approximately the curve of thermal expansion near the melting point. Comparison of theoretical and experimental data indicates, particularly for Zn and Bi, satisfactory agreement. Numerical values of "melting quanta" are determined for Bi, Cd, Zn, and Hg. (P11, Zn, EG-a)

37-P. The Freezing Point of Uranium. Andrew I. Dahl and Harold E. Cleaves. *Journal of Research of the National Bureau of Standards,* v. 43, Dec. 1949, p. 513-517.

Previously abstracted from *U. S. Atomic Energy Commission,* AECD-2541, Mar. 22, 1949. See item 3C-112, 1949. (P12, U)

38-P. Ferromagnetic Materials. N. F. Astbury. *Sheet Metal Industries,* v. 27, Jan. 1950, p. 43-46.

Proceedings of symposium arranged by Institution of Electrical Engineers, Nov. 7-8, 1949, London. (P16, SG-n, SG-p)

39-P. Emission of Infra-Red Radiation by Metallic Powders. H. A. Prime. *Research,* v. 3, Jan. 1950, p. 51-52.

Experiments were made using inorganic and metallic powders of various particle sizes to obtain preliminary information on distribution

of the radiation wavelengths, effect of particle size on the radiation, and possibility of using this technique as a source of long wavelength radiation. Experimental technique and results for Cu powders. (P17, Cu)

40-P. New Copper-Base Alloys Combine High Strength With High Conductivity. Webster Hodge and Kenneth Rose. *Materials & Methods,* v. 31, Jan. 1950, p. 64-65.

Development of two series of alloys for wire conductor by Battelle Memorial Institute for U. S. Army Signal Corps. Electrical and mechanical properties suit them to uses where high breaking strength, minimum volume, and high current-carrying capacity are required. The two alloys contain 6½% Ag and 12½% Fe respectively. Heat treatment and wire-drawing procedures. (P15, T1, Cu)

41-P. Effect of Adsorbed Polar Organic Compounds on Activity of Steel in Acid Solution. Norman Hackerman and E. L. Cook. *Journal of the Electrochemical Society,* v. 97, Jan. 1950, p. 1-9.

A series of aliphatic acids, amines, and esters, and one commercial corrosion inhibitor, were adsorbed from benzene solution onto SAE 1020 steel powder. These studies showed that some portion of the sorbed material, depending on the compound, could not be desorbed by fresh solvent. Effect of the adsorbed material on the activity of the steel powder in aqueous HCl. Ratio of the activity to that of untreated steel powder was found to depend on compound adsorbed and on the type of adsorption. (P13, R5, CN)

42-P. The Theory of the Change in the Conductivity of Metals Produced by Cold Work. J. K. Mackenzie and E. H. Sondheimer. *Physical Review,* ser. 2, v. 77, Jan. 15, 1950, p. 264-270.

Attempts to calculate increase in residual electrical resistance of cold worked metals by attributing the effect to an elastic distortion similar to that produced by the presence of edge-type dislocations. Mean density of dislocations in a highly cold-worked polycrystalline specimen of copper is estimated from observed resistance change and is found to be in reasonable agreement with the value derived from energy stored during work hardening. (P15)

43-P. Optical Effects in Bulk Silicon and Germanium. H. B. Briggs. *Physical Review,* ser. 2, v. 77, Jan. 15, 1950, p. 287.

High transparency and high refractive indices make possible construction of unique optical elements for infrared use. These lenses are opaque to visible and ultraviolet light. (P17, Si, Ge)

44-P. Ferromagnetic Resonance Absorption by Mo Permalloy at 2920 Mc/Sec. Junkichi Itoh and Tetsuo Akioka. *Physical Review,* ser. 2, v. 77, Jan. 15, 1950, p. 293-294.

(P16, Ni, SG-n)

45-P. Some Physical Properties of Titanium. Herbert I. Fusfeld and Joseph T. Gilbert. *Physical Review,* ser. 2, v. 77, Jan. 15, 1950, p. 302-303.

Damping, sound velocity, density, and modulus of elasticity.

(P general, Q general, Ti)

46-P. The Rehbinder Effect. E. N. da C. Andrade and R. F. Y. Randall. *Nature,* v. 164, Dec. 31, 1949, p. 1127.

Rehbinder and colleagues have reported that surface-active liquids in contact with the surface of metals, in particular of single crystals, markedly diminish mechanical strength. However, Kemsley obtained negative results with single crystals of tin. Experiments seem to indicate that the Rehbinder effect is due to a disintegrating action of the agent on the oxide film, which in its original condition strengthens the crystal, and not to any deep penetration of the liquid as supposed by Rehbinder. (P13, Q23)

47-P. Experiments on the Superconductive Transition. D. K. C. MacDonald and K. Mendelssohn. *Proceedings of the Royal Society,* ser. A, v. 200, Dec. 22, 1949, p. 66-84.

Change of electrical resistivity at the transition between the superconductive and the normal state in a longitudinal magnetic field was investigated. Experimental procedure yields consistent and reproducible results on lead, mercury and tin. Under "ideal" conditions the transition is not discontinuous. 22 ref. (P15, Pb, Hg, Sn)

48-P. The Effect of Carbon on the Activity of Sulphur in Liquid Iron. J. P. Morris and R. C. Buehl. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Feb. 1950, p. 317-322.

A study was made of equilibrium conditions in the reaction between hydrogen gas and dilute solutions of S in liquid Fe-C alloys. Carbon content has a decided influence. Effect of temperature is small. (P12, Fe)

49-P. The Vapor Pressure and Thermodynamic Activities of Zinc in Solid Alpha Brasses. A. W. Herbenar, C. A. Siebert, and O. S. Duffendack. *Journal of Metals; Transactions of the*

American Institute of Mining and Metallurgical Engineers, v. 188, Feb. 1950, p. 323-326.

Vapor pressures of Zn over solid alpha brasses were determined for six alloys containing 5-30% Zn by an absorption-spectra method. Activities and activity coefficients are given for Zn for the six alloys. (P12, Zn, Cu)

50-P. The Thermo-Elastic Effect in Iron and Nickel as a Function of Temperature. Roberto Rocca and M. B. Bever. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Feb. 1950, p. 327-333.

Adiabatic thermo-elastic temperature change was determined as a function of temperature and stress in nickel and Armco iron. Results are in agreement with an equation first derived by Lord Kelvin. Near the Curie temperature, the thermo-elastic effect changes appreciably. 26 ref. (P11, Fe, Ni)

51-P. Thermodynamic Properties of Sulphur in Molten Iron-Sulphur Alloys. Charles W. Sherman, Hans I. Elvander, and John Chipman. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Feb. 1950, p. 334-340.

The equilibrium in the reaction: $H_2(g) + S = H_2S(g)$ was reinvestigated from 1530 to 1730° C. and S concentrations up to 4.8%. Free-energy change in the above reaction was established as a function of temperature. Values of the activity coefficient of S were determined. Effect of Si on the latter was computed. 11 ref. (P12, Fe)

52-P. The Manganese Equilibrium Under Simple Oxide Slags. John Chipman, John B. Gero, and Theodore B. Winkler. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Feb. 1950, p. 341-345.

New experimental data. Slags consist of the oxides of Fe and Mn with small amounts of impurities. The new data lead to values of K_{Mn} which are significantly higher than those of Korber and Oelsen and in general somewhat above those of other investigators. Thermodynamic calculation from published data at lower temperatures gives results which agree fairly well with experimental data. 15 ref. (P12, Fe, Mn)

53-P. Surface Impedance of Superconducting Tin, Mercury, and Lead at 9200 Mc/Sec. I. Simon. *Physical Review,* ser. 2, v. 77, Feb. 1, 1950, p. 384-387.

Surface resistance and change of surface reactance were measured. Results were evaluated in terms of the penetration depth λ of Londons' theory and limiting values of λ for $T = 0$ were obtained. (P15, Sn, Hg, Pb)

54-P. Energy Bands and Mobilities in Monatomic Semiconductors. W. Shockley and J. Bardeen. *Physical Review,* ser. 2, v. 77, Feb. 1, 1950, p. 407-408.

Theoretical analysis and estimates for Si, Ge, and Te. (P15, Si, Ge, Te)

55-P. Ultrasonic Measurements in Metallic Beryllium at Low Temperatures. W. C. Overton, Jr. *Journal of Chemical Physics,* v. 18, Jan. 1950, p. 113-115.

Velocity of longitudinal waves in metallic beryllium was measured from 300 to 23° K., and transverse waves from 300 to 3° K. Adiabatic moduli and compressibility were computed from the velocities. A new technique for affixing the quartz transducer to the solid for ultrasonic measurements, in suitable solids, below 100° K., was successfully employed. (P10, Be)

56-P. Heat Transport in Superconductors. K. Mendelssohn and J. L. Olsen. *Proceedings of the Physical Society,* v. 63, sec. A, Jan. 1, 1950, p. 2-13.

Heat-conduction processes in superconductors on the basis of analogy with liquid helium II. The heat conductivity of a number of pure metals and alloys was measured in the normal and in the superconductive state and the results analyzed. In addition to change of heat conduction with temperature, magnetic hysteresis of heat conduction was investigated. 16 ref. (P11, Ta, Cb, Pb)

57-P. The Magnetization of Superconducting Plates in Transverse Magnetic Fields. E. R. Andrew and J. M. Lock. *Proceedings of the Physical Society,* v. 63, sec. A, Jan. 1, 1950, p. 13-25.

Magnetization curves of thin superconducting tin plates were measured in transverse magnetic fields. Resistance measurements on thin strips of tin in transverse fields showed that resistance only reappears for fields considerably greater than those required to start the destruction of superconductivity. (P16, P15, Sn)

58-P. Thermodynamics of Reactions in Molten Copper. R. W. Ruddle and A. Cibula. *Bulletin of the British Non-Ferrous Metals Research Association,* v. 29, Dec. 1949, p. 501-505.

Presents detailed criticisms of two

recent papers by H. Lepp: "Thermodynamics and Metallurgy of Tin Bronzes", *Metal Treatment and Drop Forging*, v. 16, Summer 1949, p. 67-76; and "Thermodynamic Analysis of the Equilibrium Reaction $6Cu + SO_2 \rightleftarrows 2Cu_2O + Cu_2S$" (in French), *Revue de Métallurgie*, v. 46, Mar. 1949, p. 155-159. (P12, Cu)

59-P. Concerning the Solubility of Nitrogen in Iron Melts With Chromium, Manganese, and Nickel Additions. (In German.) Hanns Wentrup and Otto Reif. *Archiv für das Eisenhüttenwesen*, v. 20, Nov.-Dec. 1949, p. 359-362.

Studied at 1600 and 1700° C. and at the melting points, for Cr, Mn, and Ni contents up to 20%. Results show that Cr and Mn increase the solubility of N_2, while Ni and rising temperatures reduce it. Data are graphed. 13 ref. (P12, Fe)

60-P. Determination of the Surface Tension of Molten Metals From the Shape of Stationary Droplets. (In German.) Gotthold Becker, Fritz Harder, and Heinz Kornfeld. *Archiv für das Eisenhüttenwesen*, v. 20, Nov.-Dec. 1949, p. 363-367.

Determined for pig iron, electrolytic copper, and carbonyl iron under a high vacuum and under argon, respectively. 14 ref. (P10, Fe, Cu)

61-P. Relationship of Depth of Penetration of Magnetic Fields in Superconductors to Absorptive Power of the Metal. (In German.) F. Moglich and R. Rompe. *Annalen der Physik*, ser. 6, v. 4, no. 6, 1949, p. 335-351.

Shows a correlation between depth of penetration of magnetic fields in superconduction and the limiting wave length of absorption of the metal in the short-wave part of the visible range. The strength of absorption in this range varies inversely with thermal expansion coefficient of the metals. Experimental results are presented for Hg, Ag, and other superconductive metals. (P15, P16)

62-P. Reflection Measurements on Sanded Aluminum. (In German.) Joachim Euler. *Zeitschrift für angewandte Physik*, v. 1, Dec. 1949, p. 569-573.

Wave-length dependence of diffusive power of reflection and dispersion under different conditions of incidence and reflection were studied. Effects of grain size, different impurities, and mechanical damage on sanded or coarsely ground Al surfaces. 10 ref. (P17, Al)

63-P. Method of Studying Chemical Reactions Involving Liberation of Gases. (In Russian.) Yu. V. Baimakov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Nov. 1949, p. 1331-1333.

Method enables graphic evaluation of the course of the reaction over short time intervals. Method was applied to reduction of heavy-metal oxides, to reactions between sulfides and oxides of metals, to study of content of electrolytically obtained metals, and to reduction of oxides at high temperatures. Data confirm applicability of the method. (P13)

64-P. Changes of Superconductive Properties of Thallium Under Pressure. (In Russian.) L. S. Kan, B. G. Lazarev, and A. I. Sudovtsov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 69, Nov. 11, 1949, p. 173-174.

Investigated under a pressure of 1730 kg. per sq. cm. at the temperature of liquid helium. (P15, Tl)

65-P. Magnetic Strength and Role of Displacement of Domain Boundaries During the Process of Magnetic Reversal in Highly Coercive Alloys. (In Russian.) N. Bulgakov and E. Kondorskii. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 69, Nov. 21, 1949, p. 325-328.

Investigated for alloys containing 24% Ni, 12% Al, 1.5% Cu, rest Fe; and 13% Ni, 8% Al, 3% Ca, 24% Co, rest Fe; differently heat treated, the second one being cooled in a magnetic field. Magnetic strength was measured at different temperatures. (P16, SG-n)

66-P. Concerning Changes of Volume of Tin During the Superconductive Transition in a Magnetic Field. (In Russian.) B. G. Lazarev and A. I. Sudovtsev. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 69, Nov. 21, 1949, p. 345-347.

Results of experimental investigation. (P15, Sn)

67-P. The Constant of Magnetic Anisotropy of Highly Coercive Alloys. (In Russian.) N. V. Bulgakov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 69, Dec. 1, 1949, p. 521-522.

The constant was determined for a single crystal of Alnico by means of a torsion dynamometer. The theoretical value agrees satisfactorily with the experimental one. (P16, SG-n)

68-P. The Rectangular Loop of Magnetic Hysteresis of Ferromagnetic Substances Deformed in the Range of Crystallization Temperatures. (In Russian.) M. V. Dekhtyar. *Doklady Akademii Nauk SSSR* (Reports of the

Academy of Sciences of the USSR), new ser., v. 69, Dec. 1, 1949, p. 527-530.

By application of an external tensile stress during crystal formation, conditions may be created which will cause the hysteresis loop to assume a rectangular form. Experiments on carbon-steel wire (0.65% C) confirmed this theoretical assumption. 10 ref. (P16, CN)

69-P. Influence of Aging on the Curve of Temperature Versus Coercive Force in "Dynamo" Steel. (In Russian.) Ya. S. Shur and K. B. Vlasov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 69, Dec. 1, 1949, p. 551-553.

Coercive force of steel containing 1% Si, quenched from 700-800° C., and subjected to artificial aging. (P16, AY, SG-p)

70-P. Temperature Dependence of Coercive Force in Highly Coercive Alloys. (In Russian.) N. V. Bulgakov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 69, Dec. 11, 1949, p. 627-628.

Temperature dependence of coercive force and magnetic saturation in three highly coercive alloys: "Alni" (12% Al, 24% Ni, 1.5% Cu, rest Fe); "Alnico" (12% Co, 15% Ni, 8% Al, 1.5% Cu, rest Fe); and "Magnico" (24% Co, 12% Ni, 8% Al, 3% Cu, rest Fe), differently heat treated. (P16, SG-n)

71-P. Calculation of the Second Constant of Magnetic Anisotropy in the Law of Approach to Saturation. (In Russian.) L. V. Kirenskii and L. I. Slobodskoi. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 69, Dec. 11, 1949, p. 639-642.

Improvement of the formula of Akulov for the above. The new formula is interpreted for different values of the variables. 12 ref. (P16)

72-P. Influence of Plastic Deformation on the Temperature Dependence of Coercive Force. (In Russian.) Ya. S. Shur and K. B. Vlasov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 69, Dec. 11, 1949, p. 647-650.

Investigated for iron, "dynamo", and transformer steel; Ni; and Mo-permalloy specimens, differently heat treated. (P16, SG-n, SG-p)

73-P. High Temperature Calorimetry. I. A New Adiabatic Calorimeter. L. D. Armstrong. **II. Atomic Heats of Chromium, Manganese, and Cobalt Between 0° and 800° C.** L. D. Armstrong and H. Grayson-Smith. *Canadian Journal of Research*, v. 28, sec. A, Jan. 1950, p. 44-59.

Part I: A calorimeter having the advantage that specific heat at a definite temperature can be determined by a measurement taken over a small temperature interval, with a precision of 1% or better from 400 to 800° C. Part II: Results obtained using the apparatus. 23 ref. (P12, Cr, Mn, Co)

74-P. Metallic Valences. A. I. Snow. *Journal of Chemical Physics*, v. 18, Feb. 1950, p. 233.

Two different sets of valence now being applied to metals in alloys—those of Hume-Rothery and those of Pauling. (P10)

75-P. Sign Change of Magnetostriction Caused by Expansion. (In German.) Wilhelm Braunewell and Eckart Marburg. *Zeitschrift für Naturforschung*, v. 4a, Oct. 1949, p. 491-495.

Sign changes of magnetostriction of Heusler or Fe-Ni alloys are explained by spontaneous lattice distortion caused by tensile stresses, or by the fact that applied tensile forces "twist" the magnetization vectors away from the direction of "pull", despite positive magnetostriction. Effects of stresses and Ni contents of Fe-Ni alloys on magnetic properties. 10 ref. (P16, Fe, Ni)

76-P. Herzfeld's Metal Criterion and the Question of the Existence of a Non-Conducting Amorphous Modification of All Metals. (In German.) Herbert Mayer. *Zeitschrift für Naturforschung*, v. 4a, Oct. 1949, p. 527-533.

From the dispersion theory as a basis of the assumption that a metal is formed when the atoms of an element combine to form a liquid or solid, Herzfeld concluded that the molecular refractivity must be greater than the quotient of molecular weight, over density. This can be used to explain recent results on the electrical conductivity of metal foils. 22 ref. (P15, M26)

77-P. The Magnetization Curve of Nickel Under Tensile Stress. (In German.) Otto Buhl. *Zeitschrift für Naturforschung*, v. 40, Nov. 1949, p. 601-605.

Determined for a Ni wire under different tensile stresses. The magnetization curve of the unstressed metal is quite different from that of the stressed, but the amount of stress does not affect its shape. Effect of stress on magnetic susceptibility, coercive force, and demagnetization factor. Results are evaluated in the light of various theories on magnetism. (P16, Ni)

78-P. The Internal Magnetic Field of Ferromagnetic Materials. In German.) Werner Doring. *Zeitschrift für Naturforschung,* v. 40, Nov. 1949, p. 605-610.

Theoretical analysis. Effect of size of crystallites on permeability and coercive force, and several conclusions concerning the dispersion of ferromagnetic permeability. 30 ref. (P16)

79-P. Concerning the Solubility and the Behavior of Hydrogen in Molten and Solid Magnesium and Magnesium Alloys. (In German.) F. Sauerwald. *Zeitschrift für anorganische Chemie,* v. 258, Feb. 1949, p. 27-32.

Determined in Mg and two Mg alloys at 760° C. Effects of hydrogen on mechanical properties and microstructure. Methods of removing H_2 from the molten alloys by chlorination. (P12, Mg)

80-P. Permanent Magnet Association; Central Research Laboratory. K. Hoselitz. *Research,* v. 3, Feb. 1950, p. 77-82.

Physical and metallurgical considerations in permanent-magnet materials, and results of some experimental work. 10 ref. (P16, SG-n)

81-P. Effects of Subatmospheric Temperatures on the Properties of Non-Ferrous Metals. Norman L. Mochel. "Symposium on Effects of Low Temperatures on the Properties of Materials", *American Society for Testing Materials,* Special Technical Publication No. 78, 1946, p. 47-49; discussion, p. 50.

Review of several references, particularly in connection with high-temperature alloys.
(P general, Q general, EG-a, SG-h)

82-P. Concerning the Ferromagnetic Behavior of Nickel-Cobalt Alloys. II. (In Japanese.) Mikio Yamamoto. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, June 1949, p. 15-22.

Magnetization curves for fields up to 900 oersteds were measured at room temperature for about 60 annealed Ni-Co alloys covering the entire composition range. The curves are of three types corresponding to the γ, the ϵ, and mixed γ-ϵ structures. 27 ref. (P16, Ni, Co)

83-P. The Relation Between Energy Levels of the Valence Electrons in Cu and Its Anomalous Temperatures. (In Japanese.) Mituru Sato. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, June 1949, p. 26-28.

Theoretical analysis. (P12, Cu)

84-P. Some Experiments on Fe-Cr-Al Electrical Resistance Wires. (In Japanese.) Kiichiro Shinzi. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, June 1949, p. 47-50.

Effects of Cr, Al, C, Si, and Mn on properties of alloy containing 70-85% Fe. The effects of Al and Si on electrical resistance were most remarkable and oxidation resistance was improved by Cr, Al, and Si. Cold workability was improved by rapid cooling after mild annealing. Ta was most effective in preventing grain growth caused by high-temperature heating, followed by Zr, Ti, and V. (P15, SG-q)

85-P. Crucial Experiment Demonstrating Single Domain Property of Fine Ferromagnetic Powders. C. Kittel, J. K. Galt, and W. E. Campbell. *Physical Review,* ser. 2, v. 77, Mar. 1, 1950, p. 725.

Simple experiment applicable to Fe and Ni by which single-domain effects were clearly distinguished from the ordinary processes of bulk magnetization. (P16, Fe, Ni)

86-P. Infra-Red Absorption in Silicon. H. B. Briggs. *Physical Review,* ser. 2, v. 77, Mar. 1, 1950, p. 727-728.

Results obtained on unalloyed Si and on six samples prepared by alloying high-purity Si with 0.0005-0.01%. B. (P17, Si)

87-P. Thermoelectric Power and Mobility of Carriers in Selenium. Herbert W. Henkels. *Physical Review,* ser. 2, v. 77, Mar. 1, 1950, p. 734-736.

Thermoelectric power of single crystal and microcrystalline Se was investigated as a function of temperature with parameters of crystallization temperature and oxygen content. Simultaneous measurements of resistivity were made in the cases of the microcrystalline samples.
(P15, Se)

88-P. A Thermoelectric and Thermodynamic Study of Aluminium-Base Alloys; Effect of Si, Fe, Mg or Ti. C. Crussard and F. Aubertin. *Metal Treatment and Drop Forging,* v. 16, Winter 1949-50, p. 204-208.

Previously abstracted from *Revue de Métallurgie.* See item 16-P, 1950. (P15, P12, Al)

89-P. Magnetic Properties of Palladium-Base Alloys. (In French.) Jules Wucher. *Comptes Rendus* (France), v. 229, Dec. 14, 1949, p. 1309-1310.

Magnetic properties of different alloys of Pd with Cu, Ag, Au, Al, Sn, Pb, and Sb were investigated. Tables and graphs show effects of components in various percentages.
(P16, Pd)

90-P. Physical Chemistry of Metallurgical Processes. II. Thermodynamics of Solutions. Application to Liquid Metal Alloys. III. Thermodynamics and Structure of Molten Slags. (In French.) Maurice Rey. *Revue de Métallurgie*, v. 46, Nov. 1949, p. 762-773; Dec. 1949, p. 849-858.

Critical surveys on the basis of the literature. 78 ref. (To be continued.) (P12, B21)

91-P. Research on the Residual Magnetism in Commercial Silicon and Nickel Sheet Iron. (In German.) Hans Wilde. *Frequenz*, v. 3, Nov. 1949, p. 309-319; Dec. 1949, p. 348-353.

Methods of measuring residual magnetism and separating it from hysteresis, effect of eddy currents, and residual losses. Effects of temperature and frequency on permeability, also effects of other factors. 22 ref. (P16, Fe).

92-P. "Thermobimetals". (In German.) J. Bingel. *Archiv für Metallkunde*, v. 3, Dec. 1949, p. 422-427.

Principles of operation of bimetallic thermostats and automatic switches. Thermal coefficients of expansion of various metals and alloys. Design calculations, methods of production, corrosion prevention, and testing of bimetallic assemblies. (P11, SG-a)

93-P. Magnetic Resistance Change and Types of Conductivity. I-II. (In German.) Max Kohler. *Annalen der Physik*, ser. 6, v. 5, nos. 1-2, 1949, p. 89-107.

Part I: On the basis of theoretical considerations, the behavior of bivalent metals in very strong magnetic transverse fields is uniform. Concludes that electrical resistance, in the limiting case of the very strong magnetic field, increases in proportion to the square of the magnetic field. These metals become insulators when their H values are extrapolated to infinity. Part II: A mathematical analysis on the electrical conductivity and Hall coefficient of monovalent metals in a strong magnetic field. 14 ref. (P15, P16)

94-P. Mechanism of "Electrical Erosion" of Metals. (In Russian.) S. L. Mandel'shtam and S. M. Raiskii. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Physical Series, v. 13, Sept.-Oct. 1949, p. 549-565.

Experimental investigation confirmed the hypothesis that electrical erosion is a secondary process caused by the disintegrating action of the electric arc on the opposite electrode. Influence of distance between electrodes and of shape and material of electrode on erosion; insulation of electrodes; role of enlargement of electrodes. 12 ref. (P15)

95-P. Use of Measurement of Electric Fluctuations as a Method for Investigating Processes in Metals. (In Russian.) E. Ya. Pumper. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Physical Series, v. 13, Sept.-Oct. 1949, p. 596-614.

Studied in connection with electrical resistance of different materials and in connection with fluctuations in electron tubes containing tungsten cathodes. Results confirm validity of the theory of fluctuations proposed. 11 ref. (P15)

96-P. Thermoelectric Emission of Tungsten Coated With Platinum. (In Russian.) M. D. Kruglova and I. L. Sokol'skaya. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 19, Nov. 1949, p. 1292-1300.

Energy of emission and its dependence on the coating and applied field were established. Curves of evaporation of the Pt layer at different temperatures are plotted and the value of heat of evaporation of Pt from W determined. 10 ref. (P15, W, Pt)

97-P. Kinetics of the Reactions of Columbium and Tantalum With O, N, and H. Earl A. Gulbransen and Kenneth F. Andrew. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 188, Mar. 1950, p. 586-599.

Reactions were studied in high vacua, using the vacuum microbalance method. Rates of several reactions are compared with other metals. 43 ref. (P12, N15, Cb, Ta)

98-P. The Graphical Representation of Metallurgical Equilibria. C. J. Osborn. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 188, Mar. 1950, p. 600-607.

Graphs for temperature dependence of free energies of formation of metallurgically important oxides, sulfides, chlorides, carbonates, and sulfates, which simplify derivation of metallurgical information. 70 ref. (P12)

99-P. The Physics of Sheet Steel. (Continued.) G. C. Richer. *Sheet Metal Industries*, v. 27, Feb. 1950, p. 111-115; Mar. 1950, p. 203-206.

Feb. issue: Dynamic vs. static hysteresis and the eddy-current effect. Mar. issue: The eddy-loss problem and single-phase probabilities. (To be continued.) (P16, ST)

100-P. Anomalous Skin Effect in Metals. R. G. Chambers. *Nature*, v.

165, Feb. 11, 1950, p. 239-240.
Study of the above in the range 2-90° K. for Cu, Ag, and Sn. Data are compared with those of Pippard, and of Reuter and Sondheimer. (P15, Cu, Ag, Sn)

101-P. Combustion of Magnesium Powder in Oxygen. (In French.) Hubert Scartazzini. *Comptes Rendus* (France), v. 230, Jan. 2, 1950, p. 97-98.
Spectrographic and pyrometric study of the magnesium-oxygen flame and its temperatures. (P11, Mg)

102-P. The Hall Effect of Rubidium. (In German.) Erich Krautz. *Zeitschrift für Naturforschung,* v. 5a, Jan. 1950, p. 13-15.
Conduction mechanism of Rb in comparison with that of other alkali metals. Apparatus and procedure. (P15, EG-e, Rb)

103-P. The Hall Effect of Iridium. Relationship Between Hall Effect and Arrangement of the Electrons in the Precious Metals. (In German.) P. O. Gehlhoff, E. Justi, and M. Kohler. *Zeitschrift für Naturforschung,* v. 5a, Jan. 1950, p. 16-18.
Determined at room temperature and at 81° K. Hall effects uniformly decrease from Ru to Ag and from Re to Au in the 4th and 5th periodic groups, respectively. This result (which corresponds to the quantum-mechanical explanation of the anomalous Hall effect) is explained in terms of defect electrons. 13 ref. (P15, Ir, EC-c)

104-P. (Book) **Symposium on Effects of Low Temperatures on the Properties of Materials.** 62 pages. 1946. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Special Technical Publication No. 78.
Considers plastics, elastomers, nonferrous metals, and weldments. Papers concerning metallurgy are abstracted separately. (P general, Q general)

105-P. Correlation of Geiger Counter and Hall Effect Measurements in Alloys Containing Germanium and Radioactive Antimony 124. G. L. Pearson, J. D. Struthers, and H. C. Theuerer. *Physical Review,* ser. 2, v. 77, Mar. 15, 1950, p. 809-813.
Distribution of the solute atoms in ingots of Ge-Sb alloys prepared according to a prescribed cooling cycle was measured. The solute was Sb^{124} and its distribution was measured with a Geiger counter. In addition, Hall measurements were made which show that in the impurity-saturation range each antimony atom contributes one conduction electron. This makes it possible to determine the solute distribution in non-radioactive samples by the Hall method. (P15, Ge)

106-P. Theory of Magnetic Properties and Nucleation in Alnico V. C. Kittel, E. A. Nesbitt, and W. Shockley. *Physical Review,* ser. 2, v. 77, Mar. 15, 1950, p. 839-840.
Alnico V is a permanent-magnet alloy containing 8% Al, 14% Ni, 24% Co, 3% Cu, and 51% Fe by weight, with the unique property among conventional magnet alloys that the energy product $(BH)_{max.}$ is increased by heat treatment in a magnetic field. A means whereby magnetic effects may control nucleation and produce the observed anisotropy and other properties is outlined. (P16, N2, SG-n)

107-P. Coercive Force Vs. Temperature in an Alloy With Zero Crystalline Magnetic Anisotropy. J. K. Galt. *Physical Review,* ser. 2, v. 77, Mar. 15, 1950, p. 845-846.
Results of measurements of coercive force of a powder containing 68% Ni and 32% Fe at various temperatures between −200 and +400° C. (P16, Ni)

108-P. The Effect of Electronic Paramagnetism on Nuclear Magnetic Resonance Frequencies in Metals. C. H. Townes and W. D. Knight. *Physical Review,* ser. 2, v. 77, Mar. 15, 1950, p. 852-853.
The nuclear paramagnetic resonance frequency for an atom in the metallic state usually is appreciably greater than the resonance frequency when the atom is in a nonmetallic compound. These frequency shifts are too large to be caused by differences in magnetic susceptibility in diamagnetic correction. Proposes that they are primarily due to orientation by the magnetic field of the spins of conduction electrons near the top of the Fermi distribution, and the interaction of these electrons with the nuclei. (P16)

109-P. Kinetics of the Phase Transition in Superconductors. A. B. Pippard. *Philosophical Magazine,* ser. 7, v. 41, Mar. 1950, p. 243-255.
A study was made of the influence of electromagnetic effects on the speed at which transition can occur between normal and superconducting states of a metal in a magnetic field, and it is concluded that these are powerful enough to be the dominant factor determining speed. Illustrative examples include transition of a superconducting plane slab and cylinder in a field greater than critical,

destruction of superconductivity in a wire by means of a current, and mechanism of establishment of the intermediate state. (P15)

110-P. The Magneto-Resistance of the Alkali Metals. D. K. C. MacDonald. *Proceedings of the Physical Society,* v. 63, sec. A, Mar. 1, 1950, p. 290-292.

The magneto-resistive effect was examined experimentally in the alkali metals at low temperatures. It was concluded that deviations from the free electron gas model become considerable in the case of the heavier metals, cesium and rubidium. (P16, EG-e, Ce, Rb)

111-P. Variations in the Resistance of Tin and Indium in a Magnetic Field. (In Russian.) E. S. Borovik. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 69, Dec. 21, 1949, p. 767-769.

Investigated at temperatures below 4.2° K. The irregular variation of resistance with increasing magnetic field at these low temperatures is similar to that observed for Bi and Zn by other investigators. Evidence indicates that the periodic dependence of resistance on magnetic field is a property possessed by all metals under similar conditions. (P16, Sn, In)

112-P. Magnetic Properties of Tin at Low Temperatures. (In Russian.) B. I. Verkin, B. G. Lazarev, and N. S. Rudenko. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 69, Dec. 21, 1949, p. 773-776.

Method of investigation on Sn monocrystals at temperatures of liquid hydrogen and helium. 10 ref. (P16, Sn)

113-P. The Thermodynamic and Physical Properties of the Elements. Leo Brewer. "Chemistry and Metallurgy of Miscellaneous Materials—Thermodynamics", Ed. 1, 1950, p. 13-39.

Tables of heat contents, vapor pressures, heats of vaporization, and entropies of vaporization for 60 elements prepared from data collected from the literature. 106 ref. (P12)

114-P. Thermodynamic and Physical Properties of Nitrides, Carbides, Sulfides, Silicides, and Phosphides. L. Brewer, L. A. Bromley, P. W. Gilles, and N. L. Lofgren. "Chemistry and Metallurgy of Miscellaneous Materials—Thermodynamics", Ed. 1, 1950, p. 40-59.

Free energies, heats, and entropies of formation at 298° K. are tabulated for many nitrides, carbides, and sulfides; melting temperatures and solubilities in water and acid are given for those and for silicides, phosphides, and borides. Includes a table of stable gaseous compounds at 1500, 2000, and 2500° K. and 10^{-3} to 10^{-5} mm. Hg; and a table of all possible refractory nitrides, carbides, and sulfides for the same temperature and pressure range. Volatilities, and application to construction of high-temperature, high-vacuum systems. 64 ref. (P12, B19, SG-h)

115-P. Thermal Expansion Characteristics of Stainless Steels Between −300° and 1000° F. D. E. Furman. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Apr. 1950, p. 688-691.

Determined for types 301, 304, 316, 347, 310, and 330 steels. Results provide insight into the effects of austenite stability and alloy content on expansion characteristics. (P11, SS)

116-P. Chromium-Carbon Relation in High Chromium Steels. *Industrial Heating,* v. 17, Mar. 1950, p. 510-511. Condensed from paper by D. C. Hilty.

Previously abstracted from *Electric Furnace Steel Proceedings.* See item 2B-353, 1949. (P12, D5, AY)

117-P. Cathodic Evolution of Hydrogen at Very High Current Densities. A. M. Azzam and J. O'M. Bockris. *Nature,* v. 165, Mar. 11, 1950, p. 403-404.

In the work reported heating effects and concentration overvoltages were eliminated by utilizing a very rapid flow rate (20-22 meters per sec.) of the solution over a wire electrode in a constriction; and electrode area was of the order of 0.01 sq. cm. It was found possible to apply direct measurement up to 150 amp. per sq. cm. Results for mercury, tungsten, silver, platinum, palladium, and nickel. (P15, EG-a)

118-P. Superconductivity of Uranium. B. B. Goodman and D. Shoenberg. *Nature,* v. 165, Mar. 18, 1950, p. 441-442.

New results which indicate that uranium is a superconductor, but has different transition temperatures according to purity of the specimen. (P15, U)

119-P. The Effect of Cold Working on the Electrical Resistivity of Copper and Aluminum. J. W. Rutter and James Reekie. *Physical Review,* ser. 2, v. 78, Apr. 1, 1950, p. 70-71.

Experimental results on highly pure material. (P15, Cu, Al)

120-P. Apparent Permeability and Overvoltage Factor of Magnetic Powders. (In French.) Antoine Colombani.

Comptes Rendus (France), v. 230, Feb. 6, 1950, p. 523-525.

Derives formulas and interprets them for different values of the variables. Results are said to agree well with experimental data. (P16)

121-P. Dilatometers for Determination of Magnetostriction by Volume and by Length. (In French.) Roger Vautier. *Journal des Recherches du Centre National de la Recherche Scientifique,* no. 10, 1950, p. 23-27.

Structural details and technique of operation. (P16)

122-P. Internal Demagnetization Factors of Highly Coercive Alloys. (In Russian.) N. V. Balgakov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Jan. 11, 1950, p. 205-206.

Investigated for "Alni", "Alnico", and "Magnico" alloys, cooled from a temperature above the Curie point in a magnetic field. Ten specimens differently heat treated were tested. (P16, SG-n)

123-P. The Stability and Chemical Reactivity of Titanium Nitride and Titanium Carbide. F. H. Pollard and P. Woodward. *Transactions of the Faraday Society,* v. 46, Mar. 1950, p. 190-199.

Titanium nitride was found to undergo second-order decomposition in vacuum at 1000° C. and above. Reactions of both nitride and carbide with various gases were studied at 1200° C. (P13, Ti)

124-P. Variations of Curie Points of Palladium-Base Paramagnetic Alloys. (In French.) Jules Wucher. *Comptes Rendus* (France), v. 230, Feb. 20, 1950, p. 730-732.

Charted for alloys of Pd with Cu, Ag, Au, Al, Sn, Pb, Sb and Ga, as a function of "electron concentration" obtained by multiplying atomic concentration of the added element by its valence in the given alloy. Shows that Curie points of the Pd-base alloys are a function of electron concentration. (P16, Pd)

125-P. Surface Conductivity of Germanium. (In French.) Pierre Aigrain. *Comptes Rendus* (France), v. 230, Feb. 20, 1950, p. 732-733.

Method for measuring conductivity of germanium used in high-voltage rectifiers. Analysis of tabulated data indicates that, at high voltages, the theoretical law is not observed because of the increase of local temperature. A correction method for such cases is proposed. (P15, T1, Ge)

126-P. Peltier Effect on Monometallic Contacts. (In German.) Isolde Dietrich. *Zeitschrift für angewandte Physik,* v. 2, Mar. 1, 1950, p. 128-131.

It was experimentally established that the inverse effect (which is analogous to the Peltier effect) of the thermal potential at the contact cannot be observed when the contact is coated with a thin film of foreign matter. Effect of temperature of the contact on Peltier effect and Thomson effect as well as Peltier coefficient for Au and Pt were determined. (P15, Au, Pt)

127-P. (Book) **The Chemistry and Metallurgy of Miscellaneous Materials—Thermodynamics. Ed. 1.** Laurence L. Quill, editor. 329 pages. 1950. McGraw-Hill Book Co., 330 West 42nd St., New York 18. $3.00.

Papers by various authors which deal with liquid-solid equilibria, temperature-composition diagrams, thermodynamic and physical properties of elements, nitrides, carbides, sulfides, silicides, phosphides, gases, and halides. Papers concerning metals are abstracted separately. (P12)

128-P. Characteristics of Molybdenum, Titanium and Zirconium. *Industrial Heating,* v. 17, Apr. 1950, p. 684, 686.

Potential value as engineering materials for high-temperature uses. Their principal properties. Table compares characteristics with those of other common metals. (P general, Q general, Mo, Ti, Zr, SG-h)

129-P. The Preparation of Metal Single Crystals for Expansion Measurements. B. G. Childs. *Journal of Scientific Instruments,* v. 27, Apr. 1950, p. 102-103.

Method used to convert a single crystal of tin into spacers, free from strain and recrystallization, for use in an interferometric dilatometer. (P10, Sn)

130-P. Ferromagnetic Resonance Phenomena at Microwave Frequencies. K. J. Standley. *Science Progress,* v. 38, Apr. 1950, p. 231-245.

Surveys available experimental and theoretical material. Need for further experimental and theoretical work. Includes some data on pure metals and alloys. 18 ref. (P16)

131-P. Surfaces of Solids XIX. Molecular Interaction Between Metals and Hydrocarbons. William D. Harkins and E. H. Loeser. *Journal of Chemical Physics,* v. 18, Apr. 1950, p. 556-560.

Energy of interaction between a hydrocarbon and a metal increases rapidly in the order Cu, Ag, Pb, and Fe and with the value of P/P_o. Tables give values of the energy of the

vapor at saturation. Values of the work of adhesion at 25° C. for the clean metals are only slightly less than for the oxide-coated metals. The latter increase with decrease of temperature. The method in general use for calculation of work of adhesion from adhesion tension is shown to be absurd, although all of the books on surface chemistry give this method.
(P13, Cu, Ag, Pb, Fe)

132-P. Applications of Reaction Kinetics to Metallographic Problems. George-Maria Schwab and George Petroutsos. *Journal of Physical & Colloid Chemistry,* v. 54, Apr. 1950, p. 581-598.

Study of systematic variation of the activation energy of formic-acid-vapor dehydrogenation using Hume-Rothery alloys as catalysts was extended to other types of alloys, for the purpose of obtaining information about the degree of electron saturation of the first Brillouin zone. For this purpose, activation energy was measured in Au-Fe, Fe-C, Au-Sb, Cu-Sb, Cu-Mg, and Au-Pb systems of different compositions. Results are in general agreement with the basic assumptions. Frequency factors confirm the systematic influence of activation energy and lattice type stated previously. 26 ref.
(P13, M26, Au, Fe, Sb, Cu, Mg, Pb)

133-P. Average Thermionic Constants of Polycrystalline Tungsten Wires. M. H. Nichols. *Physical Review,* ser. 2, v. 78, Apr. 15, 1950, p. 158-161.

Because of its ability to produce large crystals, the "doped" variety of tungsten wire was used in study of the thermionic properties of single-crystal surfaces of tungsten. In order to determine the effect of impurities, average high-field thermionic constants of polycrystalline doped and undoped tungsten wire were measured. Constants from the doped wire were somewhat lower than those from the undoped wire. Chemical and spectroscopic analyses before and after heat treatment are included. 24 ref. (P15, W)

134-P. Infra-Red Absorption of Silicon. H. Y. Fan and M. Becker. *Physical Review,* ser. 2, v. 78, Apr. 15, 1950, p. 178-179.
(P17)

135-P. Some Developments of the Chemistry of Solids, 1912-1947. J. Arvid Hedvall. *Proceedings of the XIth International Congress of Pure and Applied Chemistry* (July 1947), v. 1, p. 145-157.

Discoveries and development of theories. 24 ref. (P13)

136-P. On the Change of the Resistance of Single-Crystals of Gallium in a Magnetic Field (In English.) J. W. Blom. *Physica,* v. 16, Feb. 1950, p. 144-151.

Presents for single-crystals of Ga, with the shorter crystal axes parallel to the current, rotational diagrams giving increase of resistance in a magnetic field as a function of orientation of the field with respect to the current. (P16, Ga)

137-P. The Kohler Diagram for the Magnetic Increase of the Resistance of Gallium Single Crystals. (In English.) J. W. Blom. *Physica,* v. 16, Feb. 1950, p. 152-170.

On plotting results of measurements on the magnetic increase in resistance of single-crystals of Ga as Kohler diagrams, characteristic functions were found, both for transverse and parallel orientation of the field with respect to the current. This facilitates observation of the results for different temperatures and also enables one to compare the measurements from a number of crystals. For the transverse effect, trivalent Ga corresponds to the bivalent Cd-type and does not resemble that of In. 28 ref. (P16, Ga)

138-P. On the Fourier Analysis of the Magnetic Increase of the Resistance of Gallium; The Fourier Components in the Kohler Diagram. (In English.) J. W. Blom. *Physica,* v. 16, Feb. 1950, p. 171-182.
(P16, Ga)

139-P. Thermodynamic Properties of Cobalt Arsenides. (In Russian.) M. I. Kochnev. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Jan. 21, 1950, p. 433-435.

$CoAs_2$, $CoAs_3$, CoAs, Co_3As_2, Co_2As, and Co_5As_2 were studied between 400 and 1095° C. (P12, Co, As)

140-P. Hall Effect for Zinc at Low Temperatures. (In Russian.) E. S. Borovik. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Feb. 1, 1950, p. 601-603.

Investigated for Zn single crystals at temperatures as low as 4.22° K. Results are charted and compared with those at room temperature. 10 ref. (P15, Zn)

141-P. Preparation of Rhenium Emitters and Measurements of Their Thermionic Properties. Roberto Levi and George A. Espersen. *Physical Review,* ser. 2, v. 78, May 1, 1950, p. 231-234.

Method for electroplating stable rhenium on a tungsten wire. Thermionic-emission properties were investigated and values of work function and of emissivity were obtained. 11 ref. (P17, Re)

142-P. On the Compressibility of Metallic Cesium. R. Sternheimer. *Physical Review,* ser. 2, v. 78, May 1, 1950, p. 235-243.

Volume discontinuity of Cs at 45,000 kg. per sq. cm. is attributed to a shift of the valence electrons from 6*s* zone to the empty 5*d* zones. A Wigner-Seitz calculation for the 6*s* and 5*d* bands supports this explanation. The potentials used are described and tabulated. The possible existence of similar transitions for K and Rb. 18 ref. (P10, Cs)

143-P. Thermoelectromotive Force of Superconducting Versus Normal Junctions of the Same Metal. M. C. Steele. *Physical Review,* ser. 2, v. 78, May 1, 1950, p. 308.

Measurements of temperature variation of thermal e.m.f. of superconducting vs. normal junctions were made for Sn and Pb. (P15, Sn, Pb)

144-P. Photoelectric Effects in Germanium. Bernard J. Rothlein and Frieda A. Stahl. *Sylvania Technologist,* v. 3, Apr. 1950, p. 8-11.

Fundamental principles. (P15, Ge)

145-P. Distribution of Ionization in Materials Irradiated by Two and Three Million-Volt Cathode Rays. J. G. Trump, K. A. Wright, and A. M. Clarke. *Journal of Applied Physics,* v. 21, Apr. 1950, p. 345-348.

Measurements of the depth distribution of ionization in aluminum produced by steady beams of two and three million-volt electrons. Variation of cathode-ray current density in a plane transverse to the beam, effect on this transverse distribution of additional Al scattering foils, and a practical method of cathode-ray dosage. (P15, Al)

146-P. A Null-Coil Pendulum Magnetometer. C. A. Domenicali. *Review of Scientific Instruments,* v. 21, Apr. 1950, p. 327-329.

Null-method magnetometer for measurement of magnetization of small single crystals of polycrystalline specimens of ferromagnetic materials. It may also be used for measurements on paramagnetic and diamagnetic materials. (P16)

147-P. Metallurgical Factors Affecting the Magnetic and Mechanical Properties of Iron-Cobalt Alloys. J. K. Stanley. *Transactions of American Society for Metals,* v. 42, 1950, p. 150-170; discussion, p. 170-174.

Previously abstracted from Preprint. See item 3B-199, 1949. (P16, Q general, Fe, Co)

148-P. Methods of Determining Vapor Pressure of Metals. Rudolph Speiser and H. L. Johnston. *Transactions of American Society for Metals,* v. 42, 1950, p. 283-306; discussion, p. 306-307.

Previously abstracted from Preprint. See item 11-317, 1949. (P12)

149-P. High-Temperature Properties of the Refractory Metals. Earl R. Parker. *Transactions of American Society for Metals,* v. 42, 1950, p. 399-404.

Data collected from a survey of the literature and private sources. Melting points, densities, and known room-temperature mechanical properties are tabulated for 14 metals with the corresponding properties of Fe and Ni for comparison. (P10, P12, Q general, EG-d, SG-h)

150-P. A Quantitative Study of the Domain Structure of Single Crystals of Silicon-Iron by the Powder Pattern Technique. L. F. Bates and F. E. Neale. *Proceedings of the Physical Society,* v. 63, sec. A, Apr. 1, 1950, p. 374-388.

For Mode III magnetization, which occurs when a field acts inside the specimen parallel to the (011) direction, the line deposits formed at right angles to this direction are spaced in good agreement with Néel's theory for the case of wide strips, but in less agreement for narrow strips. Qualitative results of other measurements on strip and disk specimens are reported and interpreted. 15 ref. (P16, Fe)

151-P. A Note on the Theory of Melting. J. K. Mackenzie and N. F. Mott. *Proceedings of the Physical Society,* v. 63, sec. A, Apr. 1, 1950, p. 411-412.

An interesting difference between close-packed metals and substances held together by van der Waals forces—such as the rare gases. (P12)

152-P. Improvements and New Results of Measurement of Variation of Electrical Resistance of Ferromagnetic Substances as a Function of Temperature. (In French.) Georges Mannevy-Tassy. *Comptes Rendus* (France), v. 230, Mar. 20, 1950, p. 1150-1152.

Results of experiments performed on Ni at temperatures up to 1297° K. Results are compared with those for other metals by use of a special graphical technique. Fe and Ni followed the same curve, but MnSb followed a different curve. (P15, Fe, Ni, SG-p)

153-P. The Effect of Thermally Induced Sonic Waves on Plastic Deformation. (In German.) Günther Leibfried. *Zeitschrift für Physik,* v. 127, Mar. 17, 1950, p. 344-356.

Theoretical, mathematical analysis develops relationship between average shear stress produced by sonic waves and melting points of metals. Values for Al, Pd, Cu, Ag, Au, and Pb are tabulated. 10 ref. (P12, Q23)

154-P. Concerning the Statistics of Solid Solutions and of Ferromagnetic Substances. (In German.) Eleonore Trefftz. *Zeitschrift für Physik,* v. 127, Mar. 17, 1950, p. 371-380.

Discusses Bethe-Ising's model for simple cubic, cubic body-centered, and the cubic face-centered lattices. Equilibrium functions for high and low temperatures from which energy and specifc heat may be derived, compared with measured specific heats of Ni, Fe, and brass. 16 ref. (P12, Ni, Fe, Cu)

155-P. Magnetic Properties of Cast Steel. (In German.) Vl. Zednik. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 16, Mar. 1950, p. 65-75.

Magnetic properties are influenced not only by relative amount and kind of alloying elements, but also by carbon content, heat treatment, and grain-boundary impurities. Compares strengths and magnetic properties of different cast steels. (P16, CI)

156-P. Concerning the Ferro-Paramagnetic Transition Range. (In German.) Friedrich Fraunberger. *Zeitscrift für Naturforschung,* v. 5a, Mar. 1950, p. 129-132.

The high-frequency resistance of nickel was measured between 350 and 550° C. In order to study the relationship of the disappearance of spontaneous magnetization to the "skin" effect. Results support the opinion that the paramagnetic Curie point is the true Curie point. 10 ref. (P16, Ni)

157-P. Magnetic Properties of Ferromagnetic Materials at High Temperatures. I. Magnetic Properties of "Senperm" Iron-Silicon-Nickel Alloys in a Weak Field at Various Temperatures. II. Magnetic Properties of Oil-Quenched "Senperm" in a Weak Field at Various Temperatures. (In Japanese.) Tatsuji Yamamoto, Hisayoshi Chiba, and Teijiro Miyama. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Oct. 1949, p. 6-14.

Results show that allovs containing about 10% Si, 16% Ni, and balance Fe (Senperm region) have an abnormal change in their magnetic properties near 300 and 550° C. The abnormality near 300° C. does not exist for Fe-Si-Ni alloys in other than the above region. For the oil-quenched samples, the abnormality shifts to 80 and 30° C., respectively. (P16, Fe, SG-n)

158-P. Developments in Modern Magnet Alloys. Alan Torry and Alun Edwards. *Nickel Bulletin,* v. 23, Mar. 1950, p. 42-46.

(P16, SG-n)

159-P. Electrical Properties of Gold-Chromium Alloys. J. O. Linde. *Nature,* v. 165, Apr. 22, 1950, p. 645-646.

Curves show change of resistance with time on aging cold worked specimens containing 21.6 atomic % Cr at different temperatures, also variation of resistance with temperature of the same alloy. (P15, Au, Cr, SG-q)

160-P. Electrochemical Research on Copper-Platinum Alloys (Determination of Potentials and Hydrogen Overvoltages.) (In German.) Brigitte Sarry. *Zeitschrift für anorganische Chemie,* v. 261, Mar. 1950, p. 187-196.

Study made to determine the relationship between the catalytic properties of mixed catalysts and their compositions. Experiments show that the potentials of the alloys (down to about 16.5 at. % Pt) are about the same as that of pure Pt; but that the potential rapidly changes as the Pt content is reduced further. Pt has a similar effect on the overvoltage of hydrogen. 13 ref. (P13, Pt, Cu)

161-P. Aluminum Sulfides, Silicon Sulfides, and the System Al-Si-S. (In German.) E. J. Kohlmeyer and H. W. Retzlaff. *Zeitschrift für anorganische Chemie,* v. 261, Mar. 1950, p. 248-260.

Process for converting molten Al and AlSi alloys entirely or partly into sulfides by passing sulfur vapor through the melts. Includes a study of the thermal properties of the different sulfides. 11 ref. (P12, Al, Si)

162-P. (Book) **Theorie der Supraleitung.** (Theory of Superconductivity.) Ed. 2. Max von Laue. 114 pages. 1949. Springer-Verlag, Berlin, Gottingen, and Heidelberg, Germany.

Latest theories of superconductivity, based on work of the author and other investigators. Includes experimental data and numerous footnote references. (P15)

163-P. The Oxidation of Beryllium at High Temperatures. Daniel Cubicciotti. *Journal of the American Chemical Society,* v. 72, May 1950, p. 2084-2086.

Rate of reaction between Be and O_2 was studied from 840 to 970° C. The oxidation was found to proceed according to the parabolic law with much smaller rate constants than for other similar reactions. Energy of activation was found to be 62 kcal. per mol. 13 ref. (P13, R2, Be)

164-P. High-Temperature Heat Contents of Some Zirconium-Containing Substances. J. P. Coughlin and E. G. King. *Journal of the American Chemical Society,* v. 72, May 1950, p. 2262-2265.

Measurements of zirconium metal, of the oxide ZrO_2, nitride ZrN, silicate $ZrSiO_4$, and chloride $ZrCl_4$. (P12, Zr)

165-P. The New Metals—Molybdenum, Titanium and Zirconium. *Petroleum Refiner,* v. 29, May 1950, p. 138.

Melting points, densities, thermal expansion coefficients, thermal conductivities, specific heats, and tension moduli of Mo, Ti and Zr, compared with common ferrous and nonferrous metals and alloys. (P10, P11, P12, Q27, Mo, Ti, Zr)

166-P. Factors Affecting Magnetic Quality. R. M. Bozorth. *Bell System Technical Journal,* v. 29, Apr. 1950, p. 251-286. Based on Chapter II of "Ferromagnetism", to be published in early 1951 by Van Nostrand.

Detailed description as applied to various metallic and nonmetallic materials. (P16)

167-P. The Influence of Pressure on the Curie Point. (In English.) A. Michels and S. R. De Groot. *Physica,* v. 16, Mar. 1950, p. 249-252.

Critically discusses a paper on the above published by Ebert and Kussmann (1938) which indicated independence of Curie point on pressure. Shows that data of the above authors was not sufficiently accurate to justify their conclusions; and that, on a thermodynamic basis, there must be a pressure effect. (P16)

168-P. The Electrical Conductivity of Binary Alloys. (In German.) G. Grube. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 54, Mar. 1950, p. 99-107.

Lecture consists of a correlated review of the literature. Graphs show conductivity isotherms, constitution diagrams, and temperature-resistance curves of various nonferrous binary alloys and of several pure nonferrous metals. 28 ref. (P15, M24, Eg-a)

169-P. Electrical and Thermal Conductivity of Bismuth Monocrystals in a Transverse Magnetic Field. (In German.) E. Grüneisen, K. Rausch, and K. Weiss. *Annalen der Physik,* ser. 6, v. 7, Nos. 1-2, 1950, p. 1-17.

Results of this study agree essentially with those of Stierstadt. Change of resistance upon reversal of magnetic field was shown to be dependent on external test conditions. The magnetic field had much less effect on thermal resistance than on electrical resistance. 13 ref. (P16, Bi)

170-P. Influence of Small Cavities on the Velocity of Sound in Metals. (In Italian.) F. Gatto. *Alluminio,* v. 19, No. 1, 1950, p. 19-26.

A variety of metals and alloys was studied, using specimens with small holes drilled in them. Relative variation is related to density, but otherwise unrelated to the metal composition. Equation is derived for sound velocity in cylindrical specimens having a transverse hole of given size and position. (P10)

171-P. The Effect of Compressive Stresses on the Linear Thermal Expansion of Magnesium and Steel. Joseph L. Rosenholtz and Dudley T. Smith. *Journal of Applied Physics,* v. 21, May 1950, p. 396-399.

A series of cylinders of annealed, extruded, pure Mg and medium soft steel were subjected to a sequence of compressive stresses at room temperature and their respective coefficients of linear thermal expansion in the direction of stress application determined from 20 to 100° C. The cylinders were then heat treated to permit either recovery or recrystallization and changes in length measured. Coefficient of linear thermal expansion and length changes are plotted as a function of true compressive stress for each metal. These properties may be used to determine the stress history of a test specimen for which characteristic curves are available. (P11, Mg, CN)

172-P. Surface Tension Effects in Oriented Thin Silver Films. G. W. Johnson. *Journal of Applied Physics,* v. 21, May 1950, p. 449-453.

Structural changes of thin oriented films of Ag produced by vacuum condensation on cleaved surfaces of single crystals of rock salt were followed as a function of temperature. Effects observed are attributed to readjustment of the oriented surface under the influence of surface-tension forces. 13 ref. (P10, N15, Ag)

173-P. The Surface Tension of Liquid Metals and the Excess Binding Energy of Surface Atoms. R. A. Oriani. *Journal of Chemical Physics,* v.

18, May 1950, p. 575-578.

By assuming that the cohesive energy of a liquid metal can be expressed as the sum of the pairwise interaction energies of nearest neighbors, for atoms on the surface and in the interior from simple considerations, it is shown that the pairwise bonding energy of surface atoms is greater than that for atoms in the interior of liquid metals. With mercury as the sole exception, this excess bonding energy is a nearly constant 2% of the cohesive energy when the liquids are taken as close-packed; but greater variation of this proportion is obtained when the liquids are taken as solid-like structure. 14 ref. (P10)

174-P. Contributions to the Data on Theoretical Metallurgy. XI. Entropies of Inorganic Substances. Revision (1948) of Data and Methods of Calculation. K. K. Kelley. *U. S. Bureau of Mines,* Bulletin 477, 1950, 147 pages.

517 references. (P12)

175-P. Summarized Proceedings of Symposium on Applications of Ultrasonics. G. Bradfield. *Proceedings of the Physical Society,* v. 63, sec. B, May 1, 1950, p. 305-322.

Symposium of the Acoustics Group of the Physical Society, held Feb. 18, 1949, which surveyed recent advances in investigation of the fundamental structure of matter. Available sources of ultrasonic power and the importance of barium titanate as a powerful and strongly coupled piezoelectric transducer. Importance of the study of cavitation. Use of ultrasonics for soldering aluminum, and refining the crystalline structure in solidification of light alloys. 32 ref.
(P10, K7, E25, Al)

176-P. Surface Tensions in the System Solid Copper-Molten Lead. G. L. J. Bailey and H. C. Watkins. *Proceedings of the Physical Society,* v. 63, sec. B, May 1, 1950, p. 350-358.

Method by which surface tensions in the systems Cu-H_2 or Cu-A and Cu-Pb-H_2 or Cu-Pb-A are determined. When lead vapor is present in the atmosphere at a partial pressure of 0.1 mm. Hg, surface tension of the Cu-gas surface has a much lower value. It is suggested that the reduction is due to adsorption of Pb at the Cu-gas surface. Failure of the liquid phase to exhibit a contact angle of zero against solid Cu surfaces is thereby understood. 10 ref. (P10, Cu, Pb)

177-P. Reports of Committee A-6 on Magnetic Properties. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 128-130.

Previously abstracted from *American Society for Testing Materials,* Preprint No. 4. See item 9-165, 1949. (P16)

178-P. Magnetism in Copper Alloys: The Effect of Iron as Impurity. Allison Butts and Paul L. Reiber, Jr. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 857-883; discussion, p. 884-886.

Previously abstracted from *American Society for Testing Materials,* Preprint No. 34. See item 3C-111, 1949. (P16, Cu)

179-P. Introduction of the Concept of Intermittent Activation of the Electronic State of Ferromagnetics. (In French.) Robert Forrer. *Comptes Rendus* (France), v. 230, Mar. 27, 1950, p. 1254-1255.

The above concept is proposed on the basis of theoretical considerations. Curie points may readily be calculated with aid of this concept. (P16)

180-P. Concerning Anomalies of the Specific Heat of Germanium and Hafnium at Low Temperatures. (In French.) Pierre Aigrain and Claude Dugas. *Comptes Rendus* (France), v. 230, Mar. 27, 1950, p. 1277-1278.

Investigated between 10 and 200° K. Deviation of the value of specific heat from that calculated according to the formula of Debye was determined. Possible causes are indicated. (P12, Ge, Hf)

181-P. Concerning the Structure of Adsorption Films Formed by Mineral Substances. (In French.) Paul Kozakevitch. *Journal de Chimie Physique et de Physico-Chimie Biologique,* v. 47, Jan.-Feb. 1950, p. 24-32.

Various surface-active metallic and oxide systems were investigated: namely, amalgams of Li, Na, K, Rb, Cs, and Ba; Na in Sn; Sb and Sn in Cu; H_2O in $AgTl(NO_3)_2$; Na_2O and P_2O_5 in FeO; and Cr_2O_3 in $Na_2Si_2O_5$. Attempts to apply Rideal's equation were successful only in certain cases. General rules for the structure of saturated films. 20 ref. (P13)

182-P. The Adsorption of Hydrogen by Tungsten, and the Mechanism of the Parahydrogen Conversion at Tungsten Surfaces. (In English.) E. K. Rideal and B. M. W. Trapnell. *Journal de Chimie Physique et de Physico-Chimie Biologique,* v. 47, Jan.-Feb. 1950, p. 126-138; discussion, p. 138.

Experimental apparatus and pro-

cedure and results obtained. Preliminary work on H_2 adsorption by evaporated Ni films has yielded results qualitatively similar to those obtained with tungsten. Evaporated carbon films have also been prepared. 21 ref. (P13, W)

183-P. Thermodynamic Relationships in Chlorine Metallurgy. Herbert H. Kellogg. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, June 1950, p. 862-872.

Equations representing the standard free energy of formation as a function of temperature, for thirty metallic chlorides, are presented and plotted on a free-energy vs. temperature diagram. Use of these data for calculations on reduction of metallic chlorides, refining of metals with chlorine, and chlorination of metallic oxides and sulphides. 37 ref. (P12, C general)

184-P. Superconductivity of Lead. H. A. Boorse, D. B. Cook and M. W. Zemansky. *Physical Review,* ser 2, v. 78, June 1, 1950, p. 635-636.

Results of the determination of zero-field transition temperatures of Pb by a.c. induction method. (P15, Pb)

185-P. Damping Cacapity. Part I. Introduction and Technique of Measurement. Edward Linacre. *Iron and Steel,* v. 23, May 1950, p. 153-156.

Review of the literature; methods of measurement, and results obtained by alteration of any of the factors involved in method of measurement or condition of the specimen are described. Theories (notably by Zener), and correlation of damping capacity with other physical properties. 64 ref. (To be continued.) (Q8)

186-P. The Maximum Range of High Energy Electrons in Aluminum and Copper. Frank L. Hereford and Charles P. Swann. *Physical Review,* ser. 2, v. 78, June 15, 1950, p. 727-731.

The above was measured in the region from 3 to 12 Mev. The magnetically analyzed beta-ray spectrum of B^{12} was employed, range values being determined from absorption curves obtained with a triple coincidence counter train. (P15, Al, Cu)

187-P. Evaporation of Zinc and Zinc Oxide Under Electron Bombardment. Francis E. Dart. *Physical Review,* ser. 2, v. 78, June 15, 1950, p. 761-764.

By use of a mass-spectrographic method, rate of evaporation of Zn and ZnO was measured as a function of temperature both with and without electron bombardment of the surface being evaporated. In the case of Zn metal, no increase of evaporation could be detected, whereas a definite increase was observed in the evaporation of ZnO. (P12, Zn)

188-P. A Theory of Secondary Electron Emission From Metals. E. M. Baroody. *Physical Review,* ser. 2, v. 78, June 15, 1950, p. 780-787.

Theory is formulated on the basis of the Sommerfeld free-electron model, momentum transfer between electrons and lattice being included by introducing a finite mean free path for elastic scattering. Explains influence of work function and width of the conduction band showing why, on the average, metals with large work function are the best emitters. The observed effect of changing the work function of a given metal by surface layers of foreign atoms is interpreted. The theory also accounts for the velocity distribution of the secondaries. 14 ref. (P15)

189-P. Magnetic Field Penetration in Superconducting Lead. M. C. Steele. *Physical Review,* ser. 2, v. 78, June 15, 1950, p. 791-793.

The magnetic susceptibility of small superconducting lead spheres was determined by a self-inductance method. On the basis of relations derived from the London theory for reducing the data, the penetration depth is calculated for three different lead samples at 4.22° K. (P16, P15, Pb)

190-P. Superconductivity of Columbium. D. B. Cook, M. W. Zemansky, and H. A. Boorse. *Physical Review,* ser. 2, v. 78, June 15, 1950, p. 820-821.

Presents and discusses graphical data. (P15, Cb)

191-P. Correlation Between Electrical and Thermal Conductivity in Nickel and Nickel Alloys. Morris E. Fine. *Journal of Metals,* v. 188, July 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 951-952.

Correlation of literature. Compares value for the ratio calculated by the electron theory of metals and experimental values for Cu and Ni alloys. 17 ref. (P15, P11, Ni)

192-P. Compilation of Body Wave Velocity Data for Cubic and Hexagonal Metals. Louis Gold. *Journal of Applied Physics,* v. 21, June 1950, p. 541-546.

Directional variation of sound wave velocities was computed where stiffness coefficients are known; the essential data are presented in the form of tables and graphs. Re-

sults for Al, Cu, Au, α-Fe, Pb, and Ag are tabulated in terms of directional indices. Compressional and shear velocities for Cd, Mg, and Zn are plotted as a function of angle formed by the direction of wave propagation and the hexagonal (c) axis from which are derived theoretical average velocities. (P10)

193-P. Work Functions of the Elements. Herbert B. Michaelson. *Journal of Applied Physics,* v. 21, June 1950, p. 536-540.

Like the chemical properties of the elements, work function is a periodic function of atomic number, as shown clearly by a new compilation of published data for 57 elements. The progressive rise and fall of work function values throughout the table of the elements appears to be sufficiently regular to permit approximations to be made of values for the metallic and semimetallic elements on which no data has yet been published. 149 ref. (P15)

194-P. Surface Roughness and Contact Angle. J. J. Bikerman. *Journal of Physical & Colloid Chemistry,* v. 54, May 1950, p. 653-658.

Contact angles were measured for distilled water in air on 18-8 stainless steel plates of different finishes. Relationship of surface roughness and contact angle. (P10, SS)

195-P. Calorimetric Method for the Determination of the Surface Energy of a Brittle Crystalline Solid. A. Kenneth Schellinger. *Science,* v. 111, June 23, 1950, p. 693-694.

The sample is contained in a suitably jacketed and instrumented chamber together with steel balls. The whole apparatus is rotated to crush the sample as in a ball mill. (P10)

196-P. Comparative Heat Losses From Bare and Anodized Aluminum Surfaces to Still Air. A. C. Burr and Robert H. Hay. *Canadian Journal of Research,* v. 28, sec. A, May 1950, p. 281-286.

Effect of anodic films on total heat losses to still air from the surfaces of cylindrical Al containers maintained at temperatures between 23 and 100° C. was studied by recording the power required to maintain the containers at various temperatures above ambient. (P11, Al)

197-P. The Cohesive Energy of Metallic Magnesium. S. Raimes. *Philosophical Magazine,* ser. 7, v. 41, June 1950, p. 568-582.

The method of Wigner and Seitz was applied to metallic Mg, using an ion-core field of the Hartree type. Two alternative self-consistent fields in the metal are considered. Wave functions and energies were found not to differ significantly in the two cases. Calculated values of lattice constant, cohesive energy, and compressibility were found to be in fair agreement with experiment. 15 ref. (P10, Mg)

198-P. Report of Committee B-4 on Electrical Heating, Resistance, and Related Alloys. *American Society for Testing Materials,* Preprint 10, 1950, 14 pages.

Includes proposed tentative test method for determining relative thermionic emissive properties of materials used in electron tubes, also detailed requirements and suggested processing procedure for standard diodes. (P15, S22, SG-q)

199-P. Preferred Domain Orientation in Permanent Magnet Alloys. M. McCaig. *Nature,* v. 165, June 17, 1950, p. 969.

Theories on the mechanism of the improvement of useful properties of "Alcomax II" achieved by cooling in a magnetic field. (P16, N5, SG-n)

200-P. Conductivity and Thermo-Electric Power of Selenium Single Crystals. K. W. Plessner. *Nature,* v. 165, June 17, 1950, p. 970-971.

Conductivity was studied as a function of applied field at −67 to 210° C. Thermo-electric power was also measured. Possible explanations for deviations from Ohm's law and other effects. (P15, Se)

201-P. Losses in Electrical Sheet Steel. K. H. Stewart. *Proceedings of the Institution of Electrical Engineers,* v. 97, Pt. II, Apr. 1950, p. 121-125; discussion, p. 126-131.

Experiments on magnetic losses in sheet steel at various power frequencies and flux densities and their interpretation. 17 ref. (P16, AY)

202-P. Some Metallurgical and Structural Factors Affecting Properties of Soft Magnetic Materials. W. F. Randall and H. H. Scholefield. *Proceedings of the Institution of Electrical Engineers,* v. 97, Pt. II, Apr. 1950, p. 133-140; discussion, p. 157-162.

The effect of metallurgical factors on magnetic properties is illustrated by reference to untreated and fully processed Ni-Fe and Si-Fe alloys. Factors considered are composition, major constituents and heterogeneity; purity or differences in ultimate composition; nonmetallic inclusions; strain content; structural orientation; grain size and grain shape; lattice ordering; magnetic domain orientation; and surface conditions and dimensional effects. Incidence and control in man-

ufacture with particular reference to effect on magnetic properties. 27 ref. (P16, EG-p)

203-P. Laminated Ferromagnetic Cores at Very Low Inductions for Use in Line Communication. R. J. Halsey. *Proceedings of the Institution of Electrical Engineers,* v. 97, Pt. II, Apr. 1950, p. 141-157; discussion, p. 157-162.

Theoretical performance for homogeneous magnetic material at very low inductions compared with test results on typical specimens of materials and cores. Results for initial permeability and eddy-current losses of single-ring stampings, and effects of stacking. Corresponding measurements follow on single turns of typical strip and on spiral cores wound with strip down to 0.0006 in. thick. Extensive data on various ferromagnetic alloys. 31 ref. (P16, SG-n, p, Fe, Ni)

204-P. The Measurement and Calculation of Pulse Magnetization Characteristics of Nickel Irons From 0.1 to 5 Microseconds. W. S. Melville. *Proceedings of the Institution of Electrical Engineers,* v. 97, Pt. II, Apr. 1950, p. 165-198; discussion, p. 229-234.

Supplement to a previous paper by same author. Tests on Radiometal, Rhometal, and Mumetal in samples wound from rolled strip 0.001-0.010 in. thick. A theory of the mechanism of pulse magnetization; a method is derived for determining analytically the theoretical magnitude of eddy currents and losses for any form of pulse which can be represented by a finite number of linear voltage changes. (P16, Ni, Fe, SG-p)

205-P. The Incremental Magnetic Properties of Silicon-Iron Alloys With Particular Reference to the Design of Air-Gapped Smoothing Chokes. R. O. Carter and D. L. Richards. *Proceedings of the Institution of Electrical Engineers,* v. 97, Pt. II, Apr. 1950, p. 199-214; discussion, p. 229-234.

Fundamental considerations involved in defining the above properties, and methods of measuring them. Measured values for the various grades of hot rolled silicon-iron in common use. Purely analytical design method for air-gapped smoothing chokes. 32 ref. (P16, Fe)

206-P. The Use of a Miniature Lloyd-Fisher Square for Power-Loss Measurements at Audio Frequencies. O. I. Butler. *Proceedings of the Institution of Electrical Engineers,* v. 97, Pt. II, Apr. 1950, p. 215-220; discussion, p. 229-234.

Development of method for loss measurement on magnetic materials. Data for Si steels. 15 ref. (P16, AY)

207-P. Routine Testing Equipment for Transformer Steels. N. F. Astbury, T. Emmerson, and J. McFarlane. *Proceedings of the Institution of Electrical Engineers,* v. 97, Pt. II, Apr. 1950, p. 221-228; discussion, p. 229-234.

Application of an a.c.-d.c. null wattmeter method to routine work. The wattmeter circuit is incorporated with computing networks. (P15, AY, SG-p)

208-P. Some Properties and Tests of Magnetic Powders and Powder Cores. C. E. Richards, S. E. Buckley, P. R. Bardell, and A. C. Lynch. *Proceedings of the Institution of Electrical Engineers,* v. 97, Pt. II, Apr. 1950, p. 236-245; discussion, p. 267-272.

Powders of Fe or Fe-Ni alloys can be made either mechanically or chemically. The particles are then insulated and pressed into cores; high-permeability cores must be annealed after pressing. The permeability of the core depends mainly on the effectiveness of packing of the particles. Test methods and data for various materials, both commercial and experimental, including some ferrites. 19 ref. (P16, H10, Fe, Ni)

209-P. Resistivity of Pure Metals at Low Temperatures. I. The Alkali Metals. D. K. C. MacDonald and K. Mendelssohn. *Proceedings of the Royal Society,* ser. A, v. 202, June 22, 1950, p. 103-126.

Technique for measuring resistance between 1.5 and 20° K. continuously. Resistivity was determined in this region, and results are discussed in comparison with theory. Resistivity of sodium was found to agree closely with theory, while in the case of the other metals the hypothesis of quasi-free conduction electrons does not seem to be fully justified. 30 ref. (P15, EG-e)

210-P. Graphic Method for Simultaneous Determination of Optical Constants and Thicknesses of Very Thin Metallic Films. (In French.) Damien Male. *Comptes Rendus* (France), v. 230, Apr. 3, 1950, p. 1349-1351.

Method based on measurement of factors of reflection and transmission of normal incidence. Data for a typical determination of gold and silver films. (P17, Au, Ag)

211-P. Antiferromagnetism and Intermittent Activation in Iron-Chromium and Iron-Vanadium Alloys. (In French.) Robert Forrer. *Comptes Rendus* (France) v. 230, May 3, 1950, p. 1584-1585. (P16, Fe)

212-P. Certain Detector Properties Possessed by Thin Films of Silver. (In French.) André Blanc-Lapierre and

Marcel Perrot. *Comptes Rendus* (France), v. 230, May 15, 1950, p. 1749-1751.

Detector properties of very thin films of silver subjected to strong electrical fields. These properties are related to the curve of current voltage. Influence of constant polarization voltage, alternating current, and frequency on the detector properties. (P15, Ag)

213-P. Current-Voltage Characteristics of Very Thin Silver Films for High Values of Electrical Field. (In French.) André Blanc-Lapierre and Marcel Perrot. *Comptes Rendus* (France), v. 230, May 8, 1950, p. 1641-1643.

A very important deviation from Ohm's law was observed at room temperature. This phenomenon is explained on the basis of theoretical considerations. Method of investigation. (P15, Ag)

214-P. Influence of Annealing on the Residual Magnetization of Ferromagnetics. (In French.) Jean-Claude Barbier. *Comptes Rendus* (France), v. 230, May 8, 1950, p. 1643-1645.

Investigations showed that annealing of magnetized substances causes a decrease of residual magnetization with increased temperature proportional to the square of the temperature changes. This phenomenon is in accord with the theory of L. Neel concerning the influence of thermal fluctuation on magnetization. (P16, J23, SG-n)

215-P. Electrical Properties of Thin Films of Germanium. (In French.) Jean-Michel Dunoyer. *Comptes Rendus* (France), v. 230, May 8, 1950, p. 1664-1665.

Investigations confirm the observations of Koenig indicating a considerable variation of coefficient of resistance during transformation from the crystalline state to the amorphous. A slight rectification effect was observed for the layers of evaporated Ge; this effect can be considerably amplified by using complex layers. (P15, Ge)

216-P. Theory of Magnetic Resistance Effects in Metals. (In German.) Max Kohler. *Annalen der Physik,* ser. 6, v. 6, Sept. 19, 1949, p. 18-38.

Critically reviews reported experiments on changes in the electrical resistance of metals in a magnetic field; and, on the basis of his own studies, concludes that, because of its complex mathematical character, theory is limited to a relatively few general statements which have been experimentally confirmed. 31 ref. (P16)

217-P. Heat Conduction of Metals in a Strong Magnetic Field. (In German.) Max Kohler. *Annalen der Physik,* ser. 6, v. 5, Nov. 26, 1949, p. 181-189.

Experimentation at low temperatures by Grüneisen and de Haas plus mathematical analysis shows that an extremely strong transverse magnetic field has a different effect on monovalent than on bivalent metals. 14 ref. (P16, P11)

218-P. Secondary Electron Emission of Metal Mixtures. (In German.) H. Salow. *Annalen der Physik,* ser. 6, v. 5, Jan. 16, 1950, p. 417-428.

The secondary-emission properties of binary metal mixtures are similar to those of molten alloys containing the same components. These mixtures, especially Cu-Mg, were found to be electrically and thermally stable and insensitive to CO_2-free foreign gases; films of such mixtures are well suited for secondary-emitting cathodes. 15 ref. (P11, P15)

219-P. Ferromagnetic Platinum-Manganese Alloys. (In German.) M. Auwärter and A. Kussmann. *Annalen der Physik,* ser. 6, v. 7, Apr. 1, 1950, p. 169-172.

Maximum magnetic saturation of the alloys containing 6-16% Mn was found to be 8000 gauss. Magnetizability, thermal expansion, lattice constants, and transformation temperatures of these alloys were also determined. (P16, P11, M26, Pt, Mn)

220-P. Magnetic Properties of Platinum-Iron Alloys. II. (In German.) A. Kussmann and G. Grafin v. Rittberg. *Annalen der Physik,* ser. 6, v. 7, Apr. 1, 1950, p. 173-181.

Intensity of saturation, determination of magnetothermal curves between −193° C. and the Curie point, hysteresis properties, and magnetostriction following different heat treatments for alloys containing 50-63% Pt. (P16, Pt, Fe)

221-P. Determining the Melting Point of Uranium. (In German.) Albert Allendörfer. *Zeitschrift für Naturforschung,* v. 5a, Apr. 1950, p. 234-235.

A thermo-electric method is presented. (P12, U)

222-P. Experimental Investigation of Surface Effects in Tubular Steel Sections. (In Russian.) L. R. Neiman and I. A. Zaitsev. *Elektrichestvo* (Electricity), Feb. 1950, p. 3-8.

Electrical properties. The problem of the distribution of inductive resistance on the interior and exterior for conductors of complex cross section was defined more accurately. Criteria were established for application of a simple calcula-

tion method to steel conductors of complex cross section. (P15, ST)

223-P. Distribution of Manganese and Phosphorus Between Molten Iron and Basic Slags. (In Russian.) V. A. Kozheurov. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 23, Mar. 1950, p. 233-243.

Results of a theoretical thermodynamic study. Formulas developed permit calculation of equilibrium constants of O_2, Mn, and P in the metal under basic slags of given composition. (P12, Fe)

224-P. Magnetostriction of Ni-Mn Alloys in Transverse and Longitudinal Fields. (In Russian.) D. I. Volkov and V. V. Zubov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Apr. 11, 1950, p. 863-865.

Analyzes the theory of the even effects for magnetostriction phenomena, proposed by N. S. Akulov, and shows the validity of the second rule of this theory as applied to Ni-Mn alloys. Data are tabulated and charted for alloys containing up to 21.5% Mn. (P16, Ni)

225-P. The Physics of Sheet Steel. (Continued.) G. C. Richer. *Sheet Metal Industries,* v. 27, June 1950, p. 495-500.

Eddy-loss problem and polyphase probabilities. (To be continued.) (P16, ST)

226-P. The Expansion Behavior of Enameled Cast Iron. (In German.) A. Dietzel and H. Lemme. *Sprechsaal für Keramik; Glas; Email,* v. 83, Jan. 5, 1950, p. 1-7; Jan. 20, 1950, p. 23-25.

Shows, on the basis of a literature search and experimental investigations, that cracks and other defects in enameled cast iron are not due to expansion of the iron. Specific ways of preventing such defects. Micrographs of five different cast irons in various stages of processing. 23 ref. (P11, L27, CI)

227-P. Sweat Cooling. H. L. Wheeler, Jr., and Pol Duwez. *Automotive Industries,* v. 103, July 15, 1950, p. 40, 110, 112.

Sponsored by U. S. Army Ordnance Dept., California Institute of Technology has made a study of cooling by injection of a fluid through porous walls. Some of the important test results and conclusions. Apparatus is diagrammed and heat-transfer data for a Ni-Mo-Fe alloy and for Cu are charted. (P11, Ay, Cu)

228-P. An Absolute Measurement of Copper-Copper Interfacial Free Energy. G. W. Sears. *Journal of Applied Physics,* v. 21, July 1950, p. 721.

Procedure and results of first measurement of its kind to be reported (P10, Cu)

229-P. Ultrasonic Measurement Techniques Applicable to Small Solid Specimens. H. J. McSkimin. *Journal of the Acoustical Society of America,* v. 22, July 1950, p. 413-418.

Phase comparison at high ultrasonic frequencies was found to be particularly suited to velocity of propagation measurements (and hence measurement of elastic constants) for small solid specimens such as single crystals. Pulse technique is used. Data for fused silica and single-crystal germanium. (P10, Ge)

230-P. Evaluation of the Magnetostrictive Properties of Hiperco. H. Sussman and S. L. Ehrlich. *Journal of the Acoustical Society of America,* v. 22, July 1950, p. 499-506.

Magnetostrictive properties of Hiperco, a magnetic alloy of Fe, Co, and Cr, were investigated to determine its suitability as a material for electromechanical transducers. Relations between magnetic and magnetostrictive characteristics of a material and its performance as a transducer element. The properties of Hiperco, measured after a suitable heat treatment, are discussed in relation to those criteria and a comparison made with Ni and Permendur. Performance data for a small underwater transducer constructed of Hiperco operating at remanence. (P16, SG-n)

231-P. Effect of Nuclear Reactor Radiation on Metals. D. S. Billington. *U. S. Atomic Energy Commission,* AECD-2810, Mar. 22, 1950, 10 pages.

Effect of radiation on density, electrical resistivity, hardness, and elastic modulus of Al, Cu-Au, Cu-Be, and stainless steel. (P10, P15, Q29, Q21, Al, Cu, SS)

232-P. A Survey of the Reflectivity of Some Common Metals and Alloys. A. H. Unckel. *Sheet Metal Industries,* v. 27, July 1950, p. 654-658.

Measurements were made on a wide variety of metals, using a "glossmeter" manufactured by General Electric Co., Ltd. (P17)

233-P. Some Properties of High Resistivity P-Type Germanium. W. C. Dunlap. *Physical Review,* ser. 2, v. 79, July 15, 1950, p. 286-292.

Hall effect, resistivity, and rectification characteristics were studied with respect to changes of temperature and magnetic field. 13 ref. (P15, Ge)

234-P. Magnetoresistance of Germanium Samples Between 20° and 300° K. I. Estermann and A. Foner. *Physical Review,* ser. 2, v. 79, July 15, 1950, p. 365-372.

Resistivity of "pure" Ge samples and of samples with small additions of Al, Sb, and In, was measured at various temperatures and at various orientations in external magnetic fields. Results were compared with those resulting from the theoretical investigation of a classical electron gas in combined electric and magnetic fields in an isotropic medium and in a medium possessing cubic symmetry. 15 ref. (P16, Ge)

235-P. Meissner Effect in Superconducting Alloys of Indium and Thallium. J. W. Stout and Lester Guttman. *Physical Review,* ser. 2, v. 79, July 15, 1950, p. 396.

Magnetic properties associated with the superconductivity of solid solutions containing 5, 10, 15, and 20 at .% Tl in In were investigated. Behavior resembled much more that of pure metals than has been found previously for alloys. In particular, most of the magnetic flux is expelled on decreasing the magnetic field below a critical value (Meissner effect). (P16, In)

236-P. Superconducting Bismuth Alloys. Joseph M. Reynolds and C. T. Lane. *Physical Review,* ser. 2, v. 79, July 15, 1950, p. 405-406.

Shoenberg in 1938 suggested that if an alloy of uniform composition could be prepared, it might be expected to show the characteristics of an ideal superconductor. The best chance of producing such an alloy would be to use "intermetallic compounds". The authors investigated NaBi and KBi_2. Results support the Shoenberg hypothesis. (P15, Bi)

237-P. Electronic Mobility in Germanium. V. A. Johnson and K. Lark-Horovitz. *Physical Review,* ser. 2, v. 79, July 15, 1950, p. 409-410.

Resistivity behavior of a large number of Ge samples prepared by adding varying amounts of various elements to high-purity Ge was reported in previous papers. Attempts to explain certain discrepancies in mobility behavior by a modification of the classical Hall coefficient expression. (P15, Ge)

238-P. Time Decrease of Magnetic Permeability in Alnico. R. Street and J. C. Woolley. *Proceedings of the Physical Society,* v. 63, sec. B, July 1, 1950, p. 509-519.

The formal theory, based on the concept of thermal activation of domain processes, previously proposed to account for the phenomenon of magnetic viscosity, is extended to describe time decrease of permeability. Within certain limits, predictions of theory are verified by measurements using an Alnico rod. (P16, SG-n)

239-P. The Magnetic Properties of Uranium and Uranium-Iron Alloys. L. F. Bates and J. R. Mallard. *Proceedings of the Physical Society,* v. 63, sec. B, July 1, 1950, p. 520-526.

Measurements were made of the magnetic susceptibility of fairly pure U and of alloys with 5 and 10 atomic % Fe. The specimens were found to be paramagnetic with no trace of ferromagnetism from 20 to 350° C. 15 ref. (P16, U)

240-P. The Effect of Occluded Hydrogen on the Electrical Resistance of Palladium. R. Wright. *Proceedings of the Physical Society,* v. 63, sec. A, July 1, 1950, p. 727-739.

Theoretical and experimental investigations of the absorption of hydrogen by Pd indicates that, at least at higher temperatures, the hydrogen is contained in solid solution. Apparatus for observing changes in electrical resistance of Pd during absorption and evolution of hydrogen, with which resistance-pressure isotherms from 75 to 150° C. were obtained for pressures increasing and decreasing between zero and atmospheric. Factors affecting the resistance of the Pd-H system and an explanation of the form of the isotherms. 20 ref. (P15, Pd)

241-P. The Barkhausen Effect. R. S. Tebble, I. C. Skidmore, and W. D. Corner. *Proceedings of the Physical Society,* v. 63, sec. A, July 1, 1950, p. 739-761.

Experiments on cylindrical ferromagnetic specimens. The form of the decay of induction following a Barkhausen discontinuity was investigated. Reasonable agreement between theory and experimental results was achieved. Specimens were hard-drawn iron, large-grained iron, and annealed nickel. (P16, Fe, Ni)

242-P. Domain Wall Movement in a Single Crystal. K. H. Stewart. *Proceedings of the Physical Society,* v. 63, sec. A, July 1, 1950, p. 761-765.

A single crystal of 3% Si iron was shaped so as to encourage the formation of large ferromagnetic domains. Its magnetization curve was found to contain a large Barkhausen jump, indicating reversal of magnetization in a volume of the order of 1/10 cc. Rate of change of magnetization was found to be pro-

portional to excess of applied magnetic field over a certain critical field, and could be made very slow. Suggests that rate of change is controlled by the braking effect of eddy currents on the movement of domain walls. (P16, Fe)

243-P. Nuclear Magnetic Relaxation in Metallic Lithium and Aluminium. (In English.) N. J. Poulis. *Physica,* v. 16, Apr. 1950, p. 373-376.

Nuclear magnetic relaxation was observed in metallic Al at a frequency of 9.5 mc. per sec. and in Li at 15.2, 9.5, and 6.4 mc. per sec. Relaxation time was measured at temperatures from 20 to 1.2° K. (P16, Li, Al)

244-P. Magnetic Properties as a Means of Studying Metals and Alloys. (In Czech.) Bohdan Sestak and Ladislav Jenicek. *Hutnické Listy,* v. 5, Apr. 1950, p. 155-162.

How magnetic properties can be used for study of ferromagnetic metals and alloys, these being influenced by temperature, composition, phase state and changes, and by structure. The magnetic balance on induction apparatus used for study of isothermal breakdown of austenite, magnetic determination of residual austenite; determination of magnetic anisotropy; and classification of steel on the basis of differences in magnetic properties. (P16, SG-n)

245-P. Concerning Magnetic Structure Formed in Soft Magnetic Materials as a Result of Thermo-Mechanical Treatment. (In Russian.) Ya. S. Shur and F. N. Dunaev. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 72, May 11, 1950, p. 293-296.

Results of experimental investigation showed that thermomechanical treatment (cooling from a high temperature under uniaxial stress) of 3.5% Si iron, 56% Ni and 1% Mo Permalloy, Cu Permalloy, and Permindur (49% Fe, 49% Co, 2% V) results in preferred orientation of magnetic domains. Theoretical explanation is verified experimentally. (P16, SG-p)

246-P. Temperature Dependence of Emission of Photosensitive Particles During the Atmospheric Corrosion of Magnesium and Zinc. (In Russian.) I. L. Roikh and F. E. Mazaev. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 72, May 11, 1950, p. 335-338.

Analysis of experimental data resulted in development of an empirical equation for the above relationship and for the energy of activation of the photosensitive particles. (P17, R3, Mg, Zn)

247-P. The Study of "Senperm" and Iron-Silicon-Nickel Alloys During the Formation of Superlattices. (In Japanese.) Tatuzi Yamamoto. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Dec. 1949, p. 1-5.

Some years ago, the author discovered that Fe-Si-Ni alloys containing 8-12% Si, 14-18% Ni, balance Fe, have the characteristics of "perminvar". These were designated as "Senperms". Electrical resistance at high temperatures, and dependence of electrical resistance, saturation induction, and saturation magnetization on heat treatment and composition, were studied. Results show that magnetic properties are similar to those of Permalloy and that order-disorder transformation takes place near 350-370° C. (P16, N10, SG-n)

248-P. A Study on the Anisotropy of Cold-Rolled Silicon Steel. I. (In Japanese.) Isao Gokyu, Hideo Abe, and Hisashi Takahashi. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Dec. 1949, p. 9-12.

Object of study is to obtain the best magnetic anisotropy by annealing at comparatively low temperatures, say about 800°. Experiments were made on cold rolling and recrystallization textures, and the relation between cold rolling texture and orientation was considered from a crystallographic point of view. (P16, N5, AY)

249-P. Designing Bimetal Control Devices. U. Savolainen. *Product Engineering,* v. 21, Aug. 1950, p. 115-119.

Applications, design formulas, and tabular data for various types of temperature-actuated devices. Thermostatic properties of most common bimetals are tabulated. (P11, S16, SG-a)

250-P. A Recording Fluxmeter of High Accuracy and Sensitivity. P. P. Cioffi. *Review of Scientific Instruments,* v. 21, July 1950, p. 624-628.

Instrument by which magnetization curves and major and minor hysteresis loops of ring and bar samples can be traced in a few minutes compared to several hours required by the ballistic method. (P16)

251-P. Anomalies of Propagation of Ultrasonic Vibrations in Metals in Connection With Their Structures. (In French.) E. de Kerversau, J. Bleton, and P. Bastien. *Revue de Métal-*

lurgie, v. 47, June 1950, p. 421-444; discussion, p. 444-446.

Theoretical investigation of the mechanism of production of the above anomalies, and an investigation of phenomena taking place in complex structure. Includes studies of eutectoid and hypereutectoid structures of carbon steels, comparative behavior of the same Ni-Cr-Mo steel having bainitic and pearlitic structures, and structures of overheated Ni-Cr-Mo steel. (P10, M27, ST)

252-P. Theory of Magnetically Inhomogeneous Surface Layers in Transformer Sheets. (In German.) Richard Feldtkeller. *Frequenz,* v. 4, June 1950, p. 129-134.

Investigations revealed the fact that permeability of transformer sheets varies greatly with distance from the surface. The effect of eddy currents on complex permeability of sheets with finite surface permeability is computed. (P16, EG-p)

253-P. Surface Tension of Liquid Metals. *Metal Progress,* v. 58, Aug. 1950, p. 252, 258-259, 261. Translated and condensed from "The Surface Tension of Liquid Metals and Alloys", E. Pelzel, *Berg- und Huttenmannische Monatshefte,* v. 93, 1948, p. 247-254; v. 94, 1949, p. 10-17.

The method of "maximum bubble pressure" developed by Cantor, Jaeger, and Sauerwald was used to determine surface tension. Results for Zn and Sn agree well with those of other investigators. Data for Al and Mg were determined for the first time. Surface tension of the intermetallic-compound systems Al-Mg and Mg-Zn and of two systems which do not form intermetallic compounds (Sn-Zn and Al-Zn) was studied. (P10, Zn, Sn, Al, Mg)

254-P. Oriented Crystals: Their Growth and Their Effects on Magnetic Properties. Weston Morrill. *General Electric Review,* v. 53, Aug. 1950, p. 16-21.

Increasing knowledge of influences and resultant configurations in manufacture and processing of materials gives promise of control and effective utilization of specific properties. (P16, N5, SG-n, p)

255-P. Magnetization Curves for Polycrystalline Ferromagnetics. H. Lawton and K. H. Stewart. *Proceedings of the Physical Society,* v. 63, sec. A, Aug. 1, 1950, p. 848-851.

Recent developments have led to greatly improved agreement between theory and experiment for the magnetization curves of single crystals of Fe and Fe-Si in the range 10-500 oersteds. On the basis of the assumption that in polycrystalline material magnetization is approximately uniform from grain to grain, a method is developed for deriving magnetization curves of such material by averaging the fields required to produce a given magnetization in the different constituent grains, rather than by averaging the magnetizations produced in the different grains by a given field. Application of this method gives results in fair agreement with experiment. (P16, SG-n, p)

256-P. The Mechanism of Colloid Agglomeration in the Formation of Bitter Patterns. C. D. Mee. *Proceedings of the Physical Society,* v. 63, sec. A, Aug. 1, 1950, p. 922.

Recently Bates and Neale described quantitative measurements on powder patterns, formed on Fe-Si single crystals, in which the spacing of the powder deposits was found to be twice the domain width. An explanation is furnished by some patterns observed on a Co single crystal. Illustrated. (P16)

257-P. The Optical Emissivity of Titanium and Zirconium. F. J. Bradshaw. *Proceedings of the Physical Society,* v. 63, sec. B, Aug. 1, 1950, p. 573-577.

A method of measuring emissivity using eddy-current heating. The specimen consisted of a cylinder of metal drilled with a small blackbody hole, and its real and apparent temperatures were measured with an optical pyrometer at a mean wavelength of 0.652μ. Variation of emissivity with temperature was investigated. (P17, Ti, Zr)

258-P. Static Computation of the Curie Point of Ferromagnetic Crystal Lattices. (In German.) V. Zehler. *Zeitschrift für Naturforschung,* v. 5a, June 1950, p. 344-345.

Opechowski's method; results agree closely with those of Weiss. (P16)

259-P. Influence of Boron on the Surface Tension of "Type Kh15N25" Steel. (In Russian.) Yu. A. Klyachko, L. L. Kunin, N. S. Kreshchanovskii, and E. S. Ginzburg. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 72, June 11, 1950, p. 927-928.

Investigated for molten steel containing 26.09% Ni, 15.44% Cr, 0.40% Mn, 0.26% Si, 0.04% C, 0.028% S, and 0.021% P. Boron was added in the form of ferroboron containing 18% B, in amounts corresponding to

0.06-0.3% of the total weight. Macro and microstructures are illustrated. (P10, N12, SS)

260-P. (Book) **Data on Corrosion and Heat Resistant Steels and Alloys—Wrought and Cast.** Russell Franks, J. W. Juppenlatz, V. N. Krivobok, F. L. LaQue, F. P. Peters, and E. A. Schoefer. *American Society for Testing Materials*, Special Technical Publication No. 52-A, 1950, 79 pages.

Data on physical and mechanical properties for wrought Cr steels, Cr-Ni steels, and cast corrosion and heat resistant alloys.
(P general, Q general, AY, SG-g, h)

261-P. The Rapid Determination of Relative Thermal Conductivities. Malcolm G. McLaren. *American Ceramic Society Bulletin*, v. 29, July 1950, p. 252.

Method using "Tempilstiks" (crayons which melt at definite temperatures). Essence of the method is the maintenance of a cold and hot end on the body being tested while streaking from one end to the other with the Tempilstik. The distance from the hot end to the point of melting is a measure of thermal conductivity. (P11)

262-P. Conductivity of Liquid Selenium—200°-500° C. Herbert W. Henkels. *Journal of Applied Physics*, v. 21, Aug. 1950, p. 725-731.

Se was found to be an ideal semiconductor of electricity in this range. 10 ref. (P15, Se)

263-P. Densities of Liquid and Solid Indium. D. D. Williams and R. R. Miller. *Journal of the American Chemical Society*, v. 72, Aug. 1950, p. 3821.

Procedures for determination and results. (P10, In)

264-P. A Thermodynamic Study of Liquid Metallic Solutions. II. The System Tin-Gold. O. J. Kleppa. *Journal of the American Chemical Society*, v. 72, Aug. 1950, p. 3346-3352.

Activities and "entropy fractions" for Sn in liquid Sn-Au mixtures were determined by the electromotive force method for compositions up to 78 at. % Au. Activities at 600° C., "entropy fractions", and relative partial molar and integral heats of mixing are calculated. This system shows a very large negative deviation from Raoult's law, consistent with the presence of stable intermetallic phases which give rise to a maximum in the binary phase diagram. Presence of a certain degree of short-range order is indicated. 22 ref. (P12, M24, Sn, Au)

265-P. The Solubility of Iron in Mercury at 25-700°. A. L. Marshall, L. F. Epstein, and F. J. Norton. *Journal of the American Chemical Society*, v. 72, Aug. 1950, p. 3514-3516.

Solubility was determined and an equation developed to express the results. Apparatus and procedure. (P13, Fe, Hg)

266-P. Thermal Expansion of Solids. Peter Hidnert and Wilmer Souder. *Bureau of Standards*, Circular 486, Mar. 15, 1950, 29 pages.

Ten methods for determining thermal expansion. Procedures used in determining expansion equations and coefficients of expansion of materials. Relations between thermal expansion, temperature, chemical composition, density, compressibility, specific heat, melting point, atomic weight, and other properties of materials. 59 ref. (P11)

267-P. Density of Solids and Liquids. Peter Hidnert and Elmer L. Peffer. *Bureau of Standards*, Circular 487, Mar. 15, 1950, 29 pages.

Defines density and specific gravity. Eleven methods (hydrostatic weighing, picnometer, flotation, hydrometer, falling drop, balanced column, Boyle's law, electromagnetic, elastic helix, ice calorimeter, and volumetric) for determining densities of solids and liquids; the accuracy of various methods. 79 ref. (P10)

268-P. The Electrical Conductivity of Bismuth Fibres. II. Anomalies in the Magneto-Resistance. B. Donovan and G. K. T. Conn. *Philosophical Magazine*, ser. 7, v. 41, Aug. 1950, p. 770-782.

In examining the magneto-resistance of thin fibres of Bi, which are known from previous work to be approximately single crystals, it was found that about 10% of them showed a decrease in resistance on application of a magnetic field. Influence of direction of current, direction of field, and orientation of the crystal axes. Evidence of the existence of a longitudinal Hall coefficient. If used in conjunction with the theory of conduction in anisotropic solids, it is possible to indicate the appropriate crystal orientation. 12 ref. (P15, M23, Bi)

269-P. Energies and Widths of Domain Boundaries in Ferromagnetics. B. A. Lilley. *Philosophical Magazine*, ser. 7, v. 41, Aug. 1950, p. 792-813.

Mathematical analysis covering cubic crystals, with positive or negative magnetocrystalline anisotropy coefficients, and crystals with a single easy direction of magnetization. Estimates are made of the

energies and widths of domain boundaries in nickel. Effect of magneto-elastic anisotropy energy. Theoretical values of the energies and widths of the more important types of boundary in Ni, Fe, and Co. 10 ref. (P16, Fe, Ni, Co, SG-p)

270-P. Analytical Method for Determining Magnetic Resistance and Loss in Steel. (In Russian.) B. K. Bul. *Elektrichestvo* (Electricity), May 1950, p. 10-16.

A method of setting up the equation for calculation of active, reactive, and over-all magnetic resistance. Equations are applicable for inductances from 100-200 to 15000 henrys with accuracy of 3-6%. Equation is derived for calculation of angle of loss in steel through induction. Validity of equations is confirmed by experimental data. Equations are interpreted for different value of variables. 15 ref. (P16, ST)

271-P. Electrical and Magnetic Properties of Nickel and Its Alloys. (In Spanish.) R. Dume. *Metalurgia y Electricidad,* v. 14, Apr. 1950, p. 56-57.

A short review, covering pure Ni, Ni-Mn, Ni-Cu, Ni-Cu-Zn, Ni-Cr alloys, and ferronickels. (P15, P16, Ni)

272-P. Metallurgy Behind the Decimal Point. Earle E. Schumacher. *Journal of Metals,* v. 188, Sept. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1097-1110.

Institute of Metals Division Lecture emphasizes the importance of alloying additions or impurities in metals in amounts less than 1.0%—often mere traces. Effects on mechanical, magnetic, and electrical properties. Pb and Pb alloys illustrate strength properties; irons and permanent-magnet alloys illustrate magnetic properties; and Si and Ge alloys illustrate electrical properties. Graphs, diagrams, and photomicrographs.
(P15, P16, Q23, Pb, Si, Ge, SG-n, p)

273-P. The Vapor Pressure of Silver. H. M. Schadel, Jr., and C. E. Birchenall. *Journal of Metals,* v. 188, Sept. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1134-1138.

Vapor pressure was measured by the Knudsen orifice-effusion method at 750-1050° C. using radioactive Ag^{110} as a tracer. 14 ref. (P12, Ag)

274-P. The Supercooling of Aggregates of Small Metal Particles. David Turnbull. *Journal of Metals,* v. 188, Sept. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1144-1148.

Aggregates of small droplets of Hg, Bi, Ga, and Pb were supercooled to a much greater extent than possible for large continuous masses of the same metals. These results are interpreted theoretically. Procedure is described.
(P12, Hg, Bi, Ga, Pb)

275-P. Equilibrium in the Reaction of Carbon Dioxide With Liquid Copper From 1090 to 1300° C. D. J. Girardi and C. A. Siebert.. *Journal of Metals,* v. 188, Sept. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1168-1170.

Equilibrium constant for the above reaction. 11 ref. (P12, Cu)

276-P. Ferromagnetic Domains. H. J. Williams. *Electrical Engineering,* v. 69, Sept. 1950, p. 817-822.

Characteristics and theory. Diagrams and powder patterns show structure of the domains and effects of various factors such as polishing technique, increasing and decreasing tension, direction of applied field, etc. 14 ref. (P16, SG-n, p)

277-P. The Resistivity and Hall Effect of Germanium at Low Temperatures. C. S. Hung and J. R. Gliessman. *Physical Review,* ser. 2, v. 79, Aug. 15, 1950, p. 726-727.

Data from room temperature to 2° K. (P15, Ge)

278-P. The Ionization of Hydrogen in Metals. Irvin Isenberg. *Physical Review,* ser. 2, v. 79, Aug. 15, 1950, p. 736-737.

Theory of ionization of hydrogen. It is concluded that hydrogen should ionize in all metals. (P15)

279-P. Superconductivity of Vanadium. Aaron Wexler and W. S. Corak. *Physical Review,* ser. 2, v. 79, Aug. 15, 1950, p. 737-738.

A study to help clarify the nature of the properties of hard superconductors. (P15, V)

280-P. Superconductivity in Tin-Germanium "Alloys". Ralph P. Hudson. *Physical Review,* ser. 2, v. 79, Sept. 1, 1950, p. 883.

A magnetic method was used to determine super-conducting transition curves for two alloys of Ge containing 2.3 and 9.3 atomic % Sn, respectively. (P15, Ge)

281-P. Atomic Moments of Ferromagnetic Alloys. R. M. Bozorth. *Physical Review,* ser. 2, v. 79, Sept. 1, 1950, p. 887.

Shows that the relation between atomic moment and atomic number is not nearly so simple as published

curves indicate, if additional available data are used, especially those relating to the alloys of Co and Ni with Mn, Cr, and V. Available data for the binary solid solutions of the elements V to Cu are plotted. (P10, SG-n, p)

282-P. Domain Structure of a Cobalt-Nickel Crystal. R. M. Bozorth and J. G. Walker. *Physical Review,* ser. 2, v. 79, Sept. 1, 1950, p. 888.

Results of a study for a crystal containing 60% Co. (P16, Co, Ni)

283-P. Temperature Dependence of the Energy Gap in Germanium From Conductivity and Hall Data. V. A. Johnson and H. Y. Fan. *Physical Review,* ser. 2, v. 79, Sept. 1, 1950, p. 899. (P15, Ge)

284-P. Rule of Temperature Dependence of Metal Solubility in Iron. (In Russian.) I. I. Kornilov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 72, June 21, 1950, p. 1067-1070.

On the basis of theoretical considerations, verified by experimental data, the following rule was formulated: "Change of solubility of elements in the solid phase in a given solvent with temperature is determined by the relative change of the difference in atomic diameters of the elements with temperature". Using this rule, the temperature dependence may be established, not only for iron, but for other metals. (P13, Fe)

285-P. Use of Steel as an Electrical Conductor in Distribution Equipment for the Peat Industry. (In Russian.) B. I. Rozenberg. *Torfyanaya Promyshlennost* (Peat Industry), v. 27, June 1950, p. 15-17.

Applicability of carbon steel bus bars in electrical equipment. Effect of magnetic permeability, depending on field voltage, as well as specific resistance, chemical composition, and thermal and mechanical treatment of steel on its usefulness for electrical connections. (P15, T1, CN)

286-P. Resistivity of Pure Metals at Low Temperatures. II. The Alkaline Earth Metals. D. K. C. MacDonald and K. Mendelssohn. *Proceedings of the Royal Society,* ser. A, v. 202, Aug. 22, 1950, p. 523-533.

Electrical resistivity of Be, Mg, Ca, Sr, and Ba was investigated in detail in the temperature region below 20° K. In most cases the resistance was also determined in the range up to liquid-air temperatures in order to obtain estimates of Debye characteristic temperatures, which are compared with data obtained by other methods. 17 ref. (P15, Mg, Be, EG-f)

287-P. Vapor Pressure of Inorganic Substances. III. Chromium Between 1283 and 1561° K. Rudolph Speiser, Herrick L. Johnston, and Paul Blackburn. *Journal of the American Chemical Society,* v. 72, Sept. 1950, p. 4142-4143.

Thermodynamic functions are tabulated. 12 ref. (P12, Cr)

288-P. Cable Matches Expansion of Aluminum. *Aviation Week,* v. 53, Oct. 2, 1950, p. 32.

Properties of "Hyco-Span", a steel aircraft-control cable which expands and contracts at approximately the same rate as aluminum. Other advantages are nonmagnetic properties, excellent corrosion resistance, and simplified rigging and more positive control due to the cable's ability to expand and contract with the airframe. (P11, T7, T21, AY)

289-P. Semiconductors—New Vigor in an Old Field. Stephen J. Angello. *Westinghouse Engineer,* v. 10, July 1950, p. 183-186.

Theory, properties, and applications. (P15)

290-P. Effects of Inclusions on Coercive Force of Iron. L. J. Dijkstra and C. Wert. *Physical Review,* ser. 2, v. 79, Sept. 15, 1950, p. 979-985.

A theory is developed for the effect of randomly distributed nonmagnetic inclusions. Effects of surface tension and of internal magnetic poles. Measurements were made using a dispersion in iron of Fe_3C spheres, diameters of which could be varied over the desired range. Maximum effect on coercive force was found for particles of about 1200 A. diam. 12 ref. (P16, M28, Fe)

291-P. Atomic Heat of Indium at Liquid Helium Temperatures. J. R. Clement and E. H. Quinnell. *Physical Review,* ser. 2, v. 79, Sept. 15, 1950, p. 1028. (P12, In)

292-P. The Thermoelectromotive Force of Tin at the Superconducting-Normal Junction. R. T. Webber and M. C. Steele. *Physical Review,* ser. 2, v. 79, Sept. 15, 1950, p. 1028-1029.

Results of experiments made to reconcile the conflicting data of Steele and of Keesom and Matthijs. Results agree well with the former. (P15, Sn)

293-P. The Physics of Sheet Steel. (Continued.) G. C. Richer. *Sheet Metal Industries,* v. 27, Sept. 1950, p. 807-812.

Magnetization "above the knee"—completion of translational magne-

tization; approach to saturation; and rotational magnetization. (To be continued.) (P16, ST)

294-P. Departure From the Rayleigh Law of the Magnetization of a Ferromagnetic Material. H. D. Bush. *Nature,* v. 166, Sept. 2, 1950, p. 401-402.

Experiments on discontinuous changes in magnetization, as shown by the Barkhausen effect, in Fe and Ni in the region where the Rayleigh law holds. (P16, Fe, Ni)

295-P. The Electrical Resistance of Liquid Gallium in the Neighborhood of Its Melting Point. C. Dodd. *Proceedings of the Physical Society,* v. 63, sec. B, Sept. 1, 1950, p. 662-664.

In order to determine whether any discontinuous change in electrical properties takes place when a liquid is supercooled, measurements were made on liquid gallium. No such discontinuity was found. Results yield values for resistivity and temperature coefficient of resistance. (P15, Ga)

296-P. The Reductive Dissolution of Ferric Oxide in Acid. Part I. The Reductive Dissolution of Oxide Films Present on Iron. Part II. The Reductive Dissolution of Powdered Ferric Oxide. M. J. Pryor and U. R. Evans. **Part III. The Mechanism of Reductive Dissolution.** M. J. Pryor. *Journal of the Chemical Society,* May 1950, p. 1259-1276.

Part I: When oxidized iron is immersed in dilute acid and ferric oxide is destroyed by auto-reduction, rate of destruction diminishes with increase in film thickness, with increase in pH, and with decrease in temperature. Activation energy is calculated. Potential measurements show that reductive dissolution is highly polarized and that polarization increases with a rise in pH. Part II: Both rate and current efficiency of reductive dissolution of ferric oxide powders diminish with increase in temperature of previous ignition, with increase in time of reduction, and with increase in pH of the electrolyte. Concludes that, at pH values below 2.0, the rate is controlled by surface conductivity of the oxide and hence by number of surface defects. Part III summarizes the conclusions and suggests a mechanism for the reaction. (P13, Fe)

297-P. The Theory of the Transport Phenomena in Metals. E. H. Sondheimer. *Proceedings of the Royal Society,* ser. A, v. 203, Sept. 7, 1950, p. 75-98.

Exact expressions, valid for all temperatures, are obtained for electrical conductivity, thermal conductivity, and thermoelectric power of a degenerate gas of quasi-free electrons interacting with the ionic lattice of a metal. 18 ref. (P15)

298-P. The Surface Impedance of Superconductors and Normal Metals at High Frequencies. IV. Impedance at 9400 Mc./Sec. of Single Crystals of Normal and Superconducting Tin. V. Analysis of Experimental Results for Superconducting Tin. A. B. Pippard. *Proceedings of the Royal Society,* ser. A, v. 203, Sept. 7, 1950, p. 98-118; Sept. 22, 1950, p. 195-210.

29 references. (P15, Sn)

299-P. Change of Electrical Resistance of an α Iron-Carbon Alloy After Quenching. (In German.) Wolfgang Gruhl. *Zeitschrift für Metallkunde,* v. 41, June 1950, p. 171-177.

Studied experimentally for 0.05% C steel following solution heat treatment at 700° C., quenching and aging or annealing at different temperatures and for different times. (P15, J26, CN)

300-P. The Electrical Resistance of Iron-Chromium-Aluminum Alloys for Heating Elements. (In German.) Hans Thomas. *Zeitschrift für Metallkunde,* v. 41, June 1950, p. 185-190.

Effects of composition and heat treatment on electrical resistances of Fe-Cr-Al alloys containing 0-10 atomic % Cr and 0-28 atomic % Al. Analysis of the resistance-temperature curves reveals an effect of the α-γ transformation on electrical resistance. Cold working increases resistance if Al content is less than 6 atomic %, if more, it decreases resistance. (P15, SS, SG-q)

301-P. The Effect of Small Additions on the Electrical Conductivity of Copper. (In German.) F. Pawlek and H. Jahn. *Metall,* v. 4, July 1950, p. 263-266.

Preparation of massive and wire-form Cu with and without small additions of P, As, Sb, Fe, Ni, and Si, by powder-metallurgical methods. Effects on electrical conductivity. 16 ref. (P15, H10, Cu)

302-P. Heats of Fusion and Transformation of the Metals. (In German.) O. Kubaschewski. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 54, July 1950, p. 275-288.

A comprehensive review of the literature, and experimental methods for metals melting below 1550° C. Heats of fusion of Li, Ag, Mg, Ca, Ba, Zn, Cd, Al, Tl, Ge, Sb, Se, and Te were redetermined. 115 ref. (P12, EG-a)

303-P. A Method for Direct Measuring of Heats of Fusion at Elevated Temperatures. (In German.) Franz

Eberhard Wittig. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 54, July 1950, p. 288-294.

Proposed method is based on measurement of differential temperatures during the fusion process. The close agreement of test results with published data prove the accuracy and utility of the method. 13 ref. (P12)

304-P. Results of Research of Ferromagnetism in the Light of Modern Domain Theory. (In Italian.) Angelo Drigo. *Tecnica Italiana,* new ser., v. 5, May-June 1950, p. 151-158.

Results of experiments on very thin films of Fe, Co, and Ni (between 10^{-5} and 10^{-6} cm., which corresponds according to Kittel's theory, to the limit below which multidomain structure ceases to exist) show dependence of certain magnetic properties on film thickness. 24 ref. (P16, Fe, Co, Ni)

305-P. Remarks Concerning Influence of Gas on Magnetic Properties of Diamagnetic and Paramagnetic Metals and Alloys. (In French.) H. J. Seemann. *Revue de Métallurgie,* v. 47, July 1950, p. 485-486.

Results of investigation performed on the Au-Ag alloy system, test specimens of which were analyzed after heating in vacuum, in nitrogen, and after remelting in vacuum. Results are compared with those obtained by other investigators. (P16, Au, Ag)

306-P. New Alloys With High Magnetostriction: Fe-Pd and Ni-Pd. (In Russian.) Z. I. Alizade. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, July 1, 1950, p. 79-81.

Properties of above alloys (60% Fe+40% Pd) and (62.25% Ni+37.75% Pd) were investigated. Compares properties with those of a standard Ni test specimen. (P16, Fe, Ni, Pd)

307-P. Magnetostrictive Hysteresis of Highly Coercive Alloys. (In Russian.) D. I. Volkov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, July 1, 1950, p. 87-89.

Investigated for a Fe-Co-V alloy (38% Fe, 52% Co, 10% V) cold worked and annealed at 500-600° C. Method of investigation. (P16, SG-n, Co)

308-P Viscosity of Metallic Liquids. T. P. Yao and V. Kondic. *Nature,* v. 166, Sept. 16, 1950, p. 483.

Results for pure Sn and the Sn-Zn system which show deviation from the usual viscosity-temperature law near the melting points. (P10, Sn, Zn)

309-P. Field Variation of the Superconducting Penetration Depth. A. B. Pippard. *Proceedings of the Royal Society,* ser. A, v. 203, Sept. 22, 1950, p. 210-223.

The high-frequency technique developed previously was used to investigate the dependence of penetration depth in superconducting tin on strength of applied field. 19 ref. (P15, Sn)

310-P. Size Effect Variation of the Electrical Conductivity of Metals. D. K. C. MacDonald and K. Sarginson. *Proceedings of the Royal Society,* ser. A, v. 203, Sept. 22, 1950, p. 223-240.

Experiments and theoretical work. Experimental results for conductivity in thin wires of pure Na of varying diameter in the absence of a magnetic field and also in the presence of longitudinal and transverse magnetic fields. Variation of resistance with size in the case of square wires. Theoretical analysis of the alteration in conductivity produced in metallic films by application of transverse magnetic fields is compared with the corresponding experimental results for the sodium cylinders. 19 ref. (P15)

311-P. Metal Ceramics. *Machine Design,* v. 22, Oct. 1950, p. 101-102.

Deals principally with "Metamic LT-1", a metal ceramic developed by Haynes Stellite Div., Union Carbide and Carbon Corp. Physical and mechanical properties, typical applications, and present limitations. Composition is not given. (P general, Q general, T general)

312-P. The Dimensional Behavior of Invar. B. S. Lement, B. L. Averbach, and Morris Cohen. *American Society for Metals,* Preprint No. 39, 1950, 27 pages.

Behavior occurring during aging was studied as a function of time, temperature, heat treatment, and chemical composition. Expansion coefficient was studied from −40 to +40° C. as a function of composition and heat treatment. A heat treatment resulting in good dimensional stability and low expansion coefficient was devised. 16 ref. (P11, Fe, SG-s)

313-P. The Magnetostriction of Permanent Magnet Alloys. E. A. Nesbitt. *Journal of Applied Physics,* v. 21, Sept. 1950, p. 879-889.

Magnetostriction measurements were made on various alloys having coercive forces of 50-600 oersteds.

The alloys are classified into two types on the basis of their behavior. In the carbon-hardening type, high coercive force accompanies high magnetostriction. In the carbon-free type, this is not the case. Modern theories are necessary to explain the latter behavior, which is in disagreement with the classical strain theory of coercive force. 17 ref. (P16, Fe, SG-n)

314-P. The Thermal Expansion Coefficient and the Melting Point of Cubic Elements. M. E. Straumanis. *Journal of Applied Physics,* v. 21, Sept. 1950, p. 936.

Linear expansion coefficient of cubic elements is plotted against melting point of the same elements. The curve shows clearly that generally the coefficient of cubic elements decreases with increasing melting point. (P11, P12)

315-P. The Tracing and Interpretation of Asymmetrical Hysteresis Loops. G. M. Ettinger. *Journal of Applied Physics,* v. 21, Sept. 1950, p. 936-937.

Method for displaying the asymmetrical hysteresis loops exhibited by magnetic materials subjected simultaneously to a.c. and d.c. magnetizing forces. Results for "Permalloy C". (P16, Ni)

316-P. Thermal Expansion Characteristics of Beryllium. R. M. Treco. *Journal of Metals,* v. 188, Oct. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1274-1276.

Linear expansion coefficients for annealed and extruded beryllium for temperatures up to 1000° C. Results of expansion measurements on a single crystal of Be in relation to preferred orientation. Volume coefficient of expansion was calculated. (P11, Be)

317-P. Activity of Liquid Silver-Silicon Alloys. H. M. Schadel, Jr., G. Derge, and C. E. Birchenall. *Journal of Metals,* v. 188, Oct. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1282-1283.

Existing distribution data for Si between liquid Fe and Ag at steelmaking temperatures, 1500-1600° C., has made activity relationships in liquid Ag-Si alloys desirable as a method of determining the Si activity in molten Fe. To this end, by use of radioactive Ag^{110} and the molecular-beam technique described in a previous paper, vapor pressure of Ag as a function of temperature was measured for three Ag-Si alloys containing 3.9, 9.3, and 15.4 atomic % (eutectic composition) Si. Curves show vapor pressure vs. temperature and activity coefficients vs. composition for three temperatures. (P12, Ag, Si, Fe)

318-P. Conductivity Measurements at Microwave Frequencies. A. C. Beck and R. W. Dawson. *Proceedings of the I.R.E.,* v. 38, Oct. 1950, p. 1181-1189.

Technique developed for the above. Results of measurements on a number of samples of different conductors having various surface conditions, treatments, and platings. Metals used include Cu, Ag, Au, Al, W, Mo, Pt, brasses, and bronzes. (P11, Cu, EG-a)

319-P. Ultrasonic Velocities of Sound in Some Metallic Liquids; Adiabatic and Isothermal Compressibilities of Liquid Metals at Their Melting Points. O. J. Kleppa. *Journal of Chemical Physics,* v. 18, Oct. 1950, p. 1331-1336.

Velocities at 12 mc. in 12 pure liquid metals at their melting points under atmospheric pressure and in 4 equi-atomic liquid metallic mixtures were determined by use of the electronic pulse-circuit technique. For the pure metals, adiabatic and isothermal compressibilities were computed. Results support the view that liquid metals at temperatures not far above their melting points are in a "solid like" state, and that equations of state for the solid state may be applicable. 12 ref. (P10)

320-P. Deformation Potentials and Mobilities in Non-Polar Crystals. J. Bardeen and W. Shockley. *Physical Review,* ser. 2, v. 80, Oct. 1, 1950, p. 72-80.

The method of effective mass, extended to apply to gradual shifts in energy bands resulting from deformations of the crystal lattice, is used to estimate interaction between electrons of thermal energy and acoustical modes of vibration. The mobilities of electrons and holes are thus related to the shifts of the conduction and valence-bond bands, respectively, associated with dilations of longitudinal waves. The theory is checked by comparison of the sum of the shifts of the conduction and valence-bond bands, as derived from the mobilities, with the shift of the energy gap with dilation. The latter was obtained independently for Si, Ge, and Te. (P10, Si, Ge, Te)

321-P. Mechanism of Magnetization in Alnico V. E. A. Nesbitt and H. J. Williams. *Physical Review,* ser. 2, v. 80, Oct. 1, 1950, p. 112-113.

Using magnetic-powder-pattern

technique, new information was obtained on mechanism of magnetization in the alloy containing 14% Ni, 8% Al, 24% Co, 51% Fe, and 3% Cu (Alnico V). This alloy is unique in that it responds to heat treatment in a magnetic field. The work reported was done in an attempt to explain this action. (P16, SG-n)

322-P. Nuclear Magnetic Relaxation and Resonance Line Shift in Metals. (In English.) J. Korringa. *Physica*, v. 16, July-Aug. 1950, p. 601-615.

Detailed theory of nuclear relaxation time in metals. Experimental results on Li^7, Al^{27}, and Cu^{63} are discussed with special reference to influence of correlation between the electrons. 14 ref. (P16, Li, Al, Cu)

323-P. Effect of Bending on "Mumetal" Core Sheets. (In German.) Fritz Assmus. *Frequenz*, v. 4, Aug. 1950, p. 192-196.

It was found that in amplifiers, etc., bending of Mumetal (77% Ni, 5% Cu, 2% Cr, rest Fe), used for cores, greatly damages desired magnetic properties. Experiments show that this undesirable effect can be kept at a minimum when the sheets are kept below a maximum thickness. (P16, Ni)

324-P. An Instrument for Measuring Magnetic Hysteresis. J. W. Apperson and E. F. Hansen. *General Electric Review*, v. 53, Oct. 1950, p. 35-40.

Instrument applicable to ferromagnetic sheet material. Simple explanation of the phenomenon of magnetism, with special reference to rotating and alternating hysteresis. 11 ref. (P16, SG-n, p)

325-P. Some Magneto-Acoustic Effects in Nickel. T. F. Rogers and S. J. Johnson. *Journal of Applied Physics*, v. 21, Oct. 1950, p. 1067-1068.

An investigation was made of effects produced by a magnetic field upon the ultrasonic propagation properties of a 99.4% Ni rod. Magneto-acoustic effects are charted and discussed. (P16, P10)

326-P. Influence of Electrodes on D-C Breakdown in Gases at High Pressure. J. G. Trump, R. W. Cloud J. G. Mann and E. P. Hanson. *Electrical Engineering*, v. 69, Nov. 1950, p. 961-964.

D.C. breakdown measurements up to 900 kv. between metallic electrodes producing a uniform field and immersed in compressed gases show markedly higher values for stainless steel after conditioning by sparkover than for aluminum electrode systems. Sparkover voltage measurements were made in air, in CO_2, in equal mixtures of CO_2 and N_2 and in N_2. Relative insulating strength of these gases diminished in the order listed, and a similar electrode dependence on higher pressure was shown in all of them. (P15, Al, SS)

327-P. Technical Apparatus for Determining Thermal Conductivity of Steels up to 500° C. Z. Horak and F. Krupka. *Review of Scientific Instruments*, v. 21, Oct. 1950, p. 827-830.

Apparatus based upon comparison of flux of heat in a conductor in the form of a bar consisting of three parts of different materials. This method enables one to measure the temperature gradients by only one differential thermocouple acting in an axial boring of the bar. (P11, ST)

328-P. Contact Potentials of Evaporated Iron Films in Air and in Nitrogen at Low Pressure. Norman Hackerman and Leland L. Antes. *Science*, v. 112, Oct. 20, 1950, p. 471.

Results of experiments. (P15, Fe)

329-P. Low Temperature Ferromagnetism of Sigma Phase in an Alloy Steel. K. W. J. Bowen and T. P. Hoar. *Research*, v. 3, Oct. 1950, p. 484.

It was found that subzero treatment at various temperatures down to −196° C. of a steel containing 18.4% Cr, 2.45% Ni, 3.40% Mo, 0.47% Ti, etc., previously heat treated 65-100 hr. to produce sigma phase, leads to an increase in ferromagnetism, part of which is permanent and part reversible on temperature change. (P16, N8, SS)

330-P. Active Centres on Metal Surfaces. *Chemical Age*, v. 63, Oct. 7, 1950, p. 507-508.

New theory and experimental results presented in some recent German papers. (P10)

331-P. The Determination of the Viscosity of Molten Metals. M. R. Hopkins and T. C. Toye. *Proceedings of the Physical Society*, v. 63, sec. B, Oct. 1, 1950, p. 773-782.

Method applicable up to about 900° C. The metal is contained in a cylindrical crucible which is allowed to oscillate about its axis under the control of the torsion in a suspension wire. Theory of the method. The viscosity of Zn was determined from 430-480° C. by this method. 11 ref. (P10, Zn)

332-P. High Frequency Permeability of Ferromagnetic Materials. R. Millership and F. V. Webster. *Proceedings of the Physical Society*, v. 63, sec. B, Oct. 1, 1950, p. 782-785.

Methods for measurement of resistive and inductive permeabilities from 150 to 10,000 Mc./s. The following materials were investigated, all

in wire form: Swedish charcoal iron, white annealed and bright; 0.50-0.55% carbon steel, white annealed and bright; and "Mumetal 6" (77% Ni, 15% Fe, 5% Cu, 2% Cr, 0.8% Mn, 0.1% Si), hard drawn. 24 ref. (P16, Fe, CN, Ni, SG-n, p)

333-P. Electrical Conductivity of Gray Tin. J. T. Kendall. *Proceedings of the Physical Society,* v. 63, sec. B, Oct. 1, 1950, p. 821-822.

Gray tin has a nonmetallic crystal structure similar to diamond. Data on variation of its electrical conductivity with temperature were determined and compared with those for Si and Ge. It is apparent that gray tin is an intrinsic semiconductor. (P15, Sn)

334-P. Heat Flow in Superconductive Alloys. K. Mendelssohn and J. L. Olsen. *Proceedings of the Physical Society,* v. 63, sec. A, Oct. 1, 1950, p. 1182-1183.

Thermal conductivity of Pb alloys containing 0.02, 0.1, 0.2, and 0.5% Bi was determined in the 2-10° K. region. Results are charted and discussed in terms of fundamental theory. (P11, Pb)

335-P. Some Optical Properties of Evaporated Layers of Silver, Copper and Tin. D. G. Avery. *Philosophical Magazine,* ser. 7, v. 41, Oct. 1950, p. 1018-1031.

Use of multiple-beam interferometry to determine relative phase changes on reflection at the silvered surfaces of an interferometer does not approach the accuracy of the older polarimetric methods. Measurements of relative phase changes on reflection at a number of layers of Ag, Cu, and Sn, together with measurements of the ellipticity of the light reflected. Variation of these quantities with thickness of some layers of Ag in relation to use of evaporated layers for measurement of the optical constants of bulk materials. 14 ref.
(P17, Ag, Cu, Sn)

336-P. Experimental Study of β-Ray Diffusion in Metallic Foils. (In French.) Julien Verhaeghe and Joseph Allewaert. *Comptes Rendus* (France), v. 231, July 10, 1950, p. 135-137.

An experimental verification of E. J. Williams' law of distribution of angular deviation of β-rays upon passing through metallic foils. Method of verification (using Cu, C, and Au foils). (P13, Cu, Au, C)

337-P. Method of Study and Interpretation of Heterogeneity of Ferromagnetic Substances in the Rayleigh Regions. (In French.) Israel Epelboin, André Marais, and Daniel Dautreppe. *Comptes Rendus* (France), v. 231, July 17, 1950, p. 222-224.

Method is characterized by successive electropolishing of ferromagnetic strips and wires. Data obtained from ferrosilicon strips subjected to various treatments are charted. (P16, Fe, SG-n)

338-P. A New Method for Determination of Magnetostriction. Application to Cobalt Ferrite. (In French.) Louis Weil, Maurice Gallay, and Pierre Poensin. *Comptes Rendus* (France), v. 231, July 17, 1950, p. 224-226.

Proposes use of strain gages. Precision of the method is not over 1%; however, in connection with industrial electronic devices, it permits very rapid determinations to be made on specimens of any shape. Experimental investigation of cobalt ferrite fully proves applicability of the method. (P16, SG-n)

339-P. Variation of Contact Resistance With Contact Pressure. (In German.) Eugen Kappler. *Zeitschrift für angewandte Physik,* v. 2, Aug. 15, 1950, p. 313-319.

Effects of various factors on the above variation for "crossed-wire" contacts of precious metals and their alloys were investigated. These included effects of applied load resulting in plastic deformation, of mono-molecular and thicker foreign films, of surface condition, elastic after-effect and hysteresis.
(P15, EG-c)

340-P. The Optical Reflecting Power of Vapor-Deposited AlAg and AlMg Alloys. (In German.) A. Boettcher. *Zeitschrift für angewandte Physik,* v. 2, Aug. 15, 1950, p. 340-343.

Experiments made to measure reflecting power by a photometric method within the range 2500-5000 A. Results are shown graphically.
(P17, Al, Ag, Mg)

341-P. Active Centers in Metals. (In German.) Otto Erbacher. *Angewandte Chemie,* v. 62, Sept. 7, 1950, p. 403-404.

Shows that active centers occur especially in mechanically worked surfaces of metals whose melting points exceed 1300° K. Elaborates on the theory of the "healing" of "disturbance centers" at a temperature of about 2/3 of the absolute melting point of the metal. (P12)

342-P. Electrical Contacts in Measuring Instruments. (In German.) Ragnar Holm. *Archiv für technisches Messen,* Aug. 1950, p. T95-T96 (4 p.).

Effects of various factors on electrical conductivity and resistance of mono and bimetallic contacts. Data for a series of bimetal combinations. 12 ref. (P15, SG-r)

343-P. Electrostatic Obstruction of Ion Adsorption on Metal Surfaces. (In German.) Otto Kroecher. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie*, v. 54, Aug. 1950, p. 369-374.

Several examples indicate that the Ostwald isotherms resulting from adsorption of metal ions on metal surfaces are not the sums of Langmuir isotherms of different active centers, but are the result of mutual electrostatic obstruction of the adsorption process. (P13)

344-P. Experiments Made To Measure the Electrical Conductivity of Gray Tin. (In German.) G. Busch, J. Wieland, and H. Zoller. *Helvetica Physica Acta*, v. 23, fasc. 1, 1950, p. 523-525.

Results of experiments made with pure α-tin and its alloys containing less than 1% of other elements. It was found that the metal has inherent conductivity at high temperatures but is semiconducting at low temperatures. (P15, Sn)

345-P. The Activity of Sulphur in Liquid Steel; The Influence of Copper. Tarkel Rosenqvist and Earl M. Cox. *Journal of Metals*, v. 188, Nov. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 188, 1950, p. 1383-1393; discussion, p. 1395.

Steel melts of various S and Cu contents were brought into equilibrium with a H_2S-H_2 mixture of the escaping tendency of sulfur. It was shown that small amounts of Cu lowered the sulfur activity, but not sufficiently to affect the desulfurization process. 11 ref. (P12, ST)

346-P. Isothermal Decomposition of Nickel Carbide. L. J. E. Hofer, E. M. Cohn, and W. C. Peebles. *Journal of Physical & Colloid Chemistry*, v. 54, Nov. 1950, p. 1161-1169.

The present study like a previous one of a carburized cobalt Fischer-Tropsch catalyst was made to gain more insight into the formation of free carbon during hydrocarbon synthesis. Thermal stability of Ni_3C was studied magnetically and by X-ray diffraction between 320 and 355° C. on a fully carburized and on an almost fully carburized sample. 18 ref. (P13, C-n, Ni)

347-P. Electron Transfer in Intermetallic Compounds. Linus Pauling. *Proceedings of the National Academy of Sciences*, v. 36, Oct. 1950, p. 533-538.

Analysis of interatomic distances shows that electron transfer takes place in a great many interatomic compounds, and that the numbers of electrons involved are reasonable, in relation to the changes in valence resulting from loss or gain of electrons and to the partial ionic character of the bonds between unlike atoms and the striving of atoms toward electroneutrality. (P10)

348-P. The Soft X-Ray Valence Band Spectra and the Heat of Formation of Chemical Compounds and Alloys. K. Das Gupta. *Physical Review*, ser. 2, v. 80, Oct. 15, 1950, p. 281-282.

The soft X-ray K-valence emission spectra of Mg, Al, and Si in the pure metallic state, as well as in their oxides; of silicon in SiC; and L_{III}-valence emission spectra of Fe in $AlFe_3$ were investigated in a vacuum spectrograph. (P12, P13, Mg, Al, Si)

349-P. Single Crystal Magnetostriction Constants of an Iron-Cobalt Alloy. J. E. Goldman. *Physical Review*, ser. 2, v. 80, Oct. 15, 1950, p. 301-302.

A resistance strain-gage technique was used for measurement of magnetostriction in very small single crystals of Fe-Co (30% Co). (P16, Fe, Co)

350-P. Theory of Magnetic Anisotropy in Alnico V. J. E. Goldman and R. Smoluchowski. *Physical Review*, ser. 2, v. 80, Oct. 15, 1950, p. 302-303.

New theory which explains the unusual sensitivity of the Alnico V effect to composition. (P16, Al, Ni, Co, SG-n)

351-P. The Influence of a Transverse Magnetic Field on the Conductivity of Thin Metallic Films. E. H. Sondheimer. *Physical Review*, ser. 2, v. 80, Nov. 1, 1950, p. 401-406.

Theoretical analysis for films of thickness comparable with the free path of the conduction electrons. Owing to scattering of electrons at the boundaries of the film, the Hall coefficient is increased, and electrical resistance oscillates with strength of the applied magnetic field. (P15)

352-P. On the Ordering Effect of Antiferromagnetism. Yu-Yuan Li. *Physical Review*, ser. 2, v. 80, Nov. 1, 1950, p. 457-460.

Shows, by means of the Heisenberg model, that, in general, Curie temperature of antiferromagnetism depends on external field. It is also predicted that when an antiferromagnetic crystal with face-centered cubic or close-packed hexagonal magnetic lattice is kept at sufficiently low temperatures, its neutron diffraction pattern should show a transition from that due to an order of the $\alpha\beta$-type to that of the $\alpha\beta_3$-type as the applied field is greatly increased. 11 ref. (P16)

353-P. The Kinetics of the Reactions of Beryllium With Oxygen and Nitrogen and the Effect of Oxide and

Nitride Films on Its Vapor Pressure. Earl A. Gulbransen and Kenneth F. Andrew. *Journal of the Electrochemical Society,* v. 97, Nov. 1950, p. 383-395.

Reaction with O_2 was studied from 350 to 950° C, and the reaction with N_2 from 600 to 925° C. No reaction was observed with H_2 from 300 to 882° C. A study of the vapor pressure of Be and the influence of oxide and nitride films was made using the Langmuir method. Oxide films exert a strong effect in reducing the vapor pressure, the effect varying as the square root of oxide thickness. 35 ref. (P12, Be)

354-P. The Kinetics of the Reactions of Vanadium With Oxygen and Nitrogen. Earl A. Gulbransen and Kenneth F. Andrew. *Journal of the Electrochemical Society,* v. 97, Nov. 1950, p. 396-404.

A study was made of the reaction of rolled V sheet with O_2 from 400 to 600° C. The reaction with N_2 was studied from 600 to 900° C. Compares results with those for corresponding reactions of Cb and Ta. 35 ref. (P12, V)

355-P. Density Variations in Aluminium. J. L. Snoek. *Philosophical Magazine,* v. 41, Nov. 1950, p. 1188-1192.

From careful determinations of the density of samples of Al in various conditions, the conclusion is drawn that grain boundaries in Al may have a more spacious structure than is generally assumed. (P10, M27, Al)

356-P. The de Haas-van Alphen Effect. R. B. Dingle and D. Shoenberg. *Nature,* v. 166, Oct. 14, 1950, p. 652-653.

Experiments on the above effect in Ga, Sn, and graphite (periodic field-dependence of magnetic susceptibility of metal single crystals) have now been extended to higher fields (up to 15,800 gauss), to lower temperatures (down to 1.1° K.), and to other metals; at the same time theory of the effect was reconsidered. (P16)

357-P. Change of Resistivity by Cold Working at Liquid-Air Temperature. J. Molenaar and W. H. Aarts. *Nature,* v. 166, Oct. 21, 1950, p. 690.

Relative change of resistivity with plastic deformation at liquid-air temperature was measured for wires of Cu, Ag, and Al. These were soft-annealed and stretched. The tension producing extension as well as the resistivity were measured. (P15, Cu, Ag, Al)

358-P. The Thermodynamic Background of Iron and Steelmaking Processes. II. Deoxidation. F. D. Richardson. *Journal of the Iron and Steel Institute,* v. 166, Oct. 1950, p. 137-146.

Critically surveys thermodynamic data available for solutions of O_2 and alloying elements in liquid Fe. The main deoxidation equilibria are summarized in two diagrams for 1600 and 1540° C. The general pattern of the results is discussed in terms of the interaction of dissolved O_2 and dissolved deoxidizer in the liquid metal. 42 ref. (P12, D general, ST)

359-P. Some Heat-Transfer Problems Simplified. (In English.) J. S. Abcouwer. "International Gieterij Congres 1949—Amsterdam", p. 147-161.

A mathematical treatise of heat transfer as related to casting production. (P11, E general)

360-P. Systematic Relationships of the Properties of Molten Metals and Alloys. III. (In German.) Franz Sauerwald. *Zeitschrift für Metallkunde,* v. 41, July 1950, p. 214-218.

Lowering of solidification point due to alloy additions. Supplementary remarks concerning thermodynamic properties, especially for those alloys having negative heats of formation. The volumetric behavior of Mg-Pb and Mg-Sn alloys. Analyzes X-ray data for a series of nonferrous binary alloys, also for Rose's, Wood's and Lipowitz's metals. (P12, EG-a, SG-d)

361-P. Cathodic Efficiency of Metals, Especially of Aluminum in Common Salt Solutions. (In German.) Richard Ergang and Georg Masing. *Zeitschrift für Metallkunde,* v. 41, Aug. 1950, p. 272-279.

Results of experiments on Fe, Cd, Cu, Pt, and Al in their various binary combinations, in 3% NaCl solutions of different pH's and for various periods of time. Data are tabulated and charted. 14 ref. (P13, Fe, Cd, Cu, Pt, Al)

362-P. Relation Between Thermal and Electrical Conductivity of Aluminum and Magnesium Alloys. (In German.) W. Bungardt and R. Kallenbach. *Metall,* v. 4, Aug. 1950, p. 317-321; Sept. 1950, p. 365-369.

Because of the difficulty of determining the thermal conductivity of metals at elevated temperatures, the relationship was studied on the basis of literature data. Factors which affect conductivity such as impurities, heat treatments, etc., are also considered. Sept. issue: The validity of the Wiedemann-Franz-Lorenz equation was investigated. Also, relations between thermal, electronic, and lattice conductivity. 35 ref. (P11, P15, Al, Mg)

363-P. Magnetic Properties of Cu-Fe Sintered Alloys. (In German.) Helmut

Rainer. *Metall,* v. 4, Oct. 1950, p. 416-420.

Density, elongation, remanence, coercive force, saturation, and demagnetization curve of alloys containing up to 10% Cu (produced by two different methods) were determined as functions of Cu content and sintering temperature. The increase in remanence with temperature above 500° C. is explained by Sauerwald's theory of bridge formation. (P16, H15, Fe)

364-P. Heat Changes Accompanying Magnetization in Low and Moderate Fields: the Effects of Strain, and a Theoretical Interpretation. L. F. Bates and J. H. Davis. *Proceedings of the Physical Society,* v. 63, sec. A, Nov. 1, 1950, p. 1265-1282.

The technique of Bates and coworkers was used to measure the adiabatic temperature changes occurring during magnetization of nickel under progressively increased internal strain occurring during change from the fully annealed state to the state of maximum strain, in the absence of deforming force. A new technique enabled accurate thermal curves during virgin magnetization, and in cycles up to 400 oersteds, to be obtained. The induction effect previously reported was investigated and its origin determined. A new theoretical treatment enables thermal curves to be calculated from available data on magnetization and magnetostriction. 10 ref. (P16, Ni)

365-P. A Study of Electrical Forming Phenomena at Selenium Contacts. H. K. Henisch and J. Ewels. *Proceedings of the Physical Society,* v. 63, sec. B, Nov. 1, 1950, p. 861-876.

When a reverse voltage is applied to a rectifying contact between a selenium surface and a metal electrode, the resulting current is not constant but is generally a function of time. An increase of current with time is called positive creep and a decrease at constant voltage is referred to as negative creep. Experiments at various temperatures on Se specimens of different impurity content. Dependence of above phenomena on electrical and thermal history and on nature of the counterelectrode. A theory of "current creep" is proposed. (P15, Se)

366-P. Physical Chemistry of Metallurgical Processes. (Concluded.) **Proceedings of September 1948 Discussions of the Faraday Society.** (In French.) Maurice Rey. *Revue de Métallurgie,* v. 47, Sept. 1950, p. 658-668.

Final installment presents detailed summaries of pertinent papers previously abstracted presented at above meeting. 34 ref. (P12)

367-P. The Zener Effect in Metals. (In Italian.) I. Barducci. *Alluminio,* v. 19, no. 4, 1950, p. 324-333.

Theoretical discussion of the thermoelastic (Zener) effect. Internal dissipation of elastic energy of a solid; internal dissipation of energy by vibration and bending; characteristics of the Zener effect; importance of the thermo-elastic effect; the magneto-elastic effect. 15 ref. (P11, Q21)

368-P. Life of an Incandescent Tungsten Coil and Vaporization Rate of Tungsten in a High Vacuum. (In German.) Enis Bas-Taymaz. *Zeitschrift für angewandte Physik,* v. 2, Sept. 15, 1950, p. 374-376.

Relationship to temperature was investigated. It was found that the life of the W coil may be considered terminated when its weight loss has reached a certain percentage. Since this percentage is independent of temperature, life measurements at different temperatures may be used to compute the temperature coefficient of vaporization rate. (P12, W)

369-P. A Contribution to the Problem of Anomalous Diamagnetism. (In Russian.) H. Nowotny and H. Bittner. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften,* v. 81, Oct. 15, 1950, p. 887-906.

Theories and research on anomalous diamagnetism in the Hume-Rothery γ-phases. Method and apparatus for measuring diamagnetism. Data for a variety of nonferrous alloys. 34 ref. (P16, EG-a)

370-P. Single Domain Structure in Ferromagnetic Substances and Magnetic Properties of Finely Dispersed Materials. (In Russian.) E. Kondorskii. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Sept. 11, 1950, p. 213-216.

Magnetic properties of ferromagnetic substances composed of spherical and elliptical particles and the relationship of their coercive force to shape and size were theoretically investigated. Equations are proposed and interpreted for different values of variables. (P16, SG-n)

371-P. Temperature Dependence of Magnetization Curves and Hysteresis Loops of Highly Coercive Alloys. (In Russian.) Ya. S. Shur and N. A. Baranova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Sept. 11, 1950, p. 225-228.

Investigated for "Alnico" and "Vicalloy" (51% Fe, 24% Co, 8% Ni,

3% Al; and 52% Co, 38% Fe, 10% V, respectively). The former was quenched from 1300 and annealed at 600° C. for several hours; the latter was cold worked and then annealed at 600° C. for 30 min. (P16, SG-n)

372-P. Determination of Thermal Emission by Means of Thermomagnetic Convection. (In Russian.) D. I. Ageikin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Sept. 11, 1950, p. 229-232.

The method and theoretical analysis of the proposed equations. Experimental investigations on platinum wires fully confirm the validity of the method. (P11, S16)

373-P. (Book) **Die thermodynamischen Eigenschaften der Metalloxyde. Ein Beitrag zur theoretischen Hüttenkunde.** (The Thermodynamic Properties of the Metal Oxides. A Contribution to Theoretical Metallurgy). Werner Lange. 107 pages. 1949. Springer-Verlag, Berlin, Germany.

Methods of computing thermodynamic properties of CO, CO_2, water vapor, and a series of metallic oxides. Typical examples. 132 ref. (P12)

374-P. The Magnetic Anisotropy of α-$NiSO_4 \cdot 6H_2O$ Between 13 and 295° K. A Torsion Balance for Magnetic Anisotropy Measurements. J. W. Stout and Maurice Griffel. *Journal of Chemical Physics,* v. 18, Nov. 1950, p. 1449-1454.

Data and apparatus. (P16)

375-P. Activity Measurements on Liquid Thallium Alloys. (In German.) Anna-Luise Vierk. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 54, Oct. 1950, p. 436-437.

Results of emf. measurements on Tl-Bi and Tl-Sn alloys using a special glass containing Tl ions as electrolyte and iron wire as electrodes. 10 ref. (P15, Tl, Bi, Sn)

376-P. Velocity of Sound in Metals. S. Bhagavantam and K. Ramavataram. *Proceedings of the Indian Academy of Sciences,* v. 32, sec. A, Sept. 1950, p. 197-199.

Shows experimentally, by applying the ultrasonic wedge method, that sonic velocity in brass and Al plates is independent of frequency in the range 1-10 megacycles. In order to obtain this result unambiguously, it was necessary to use plates of proper thicknesses and lateral dimensions and to eliminate coupling and boundary effects. (P10, Al, Cu)

377-P. Comparative Growth of Gray Iron Vs. Nodular Iron. Thomas E. Eagan. *Foundry,* v. 78, Dec. 1950, p. 96-99, 203-204.

Compares results of investigation with those reported elsewhere. Seven grades of gray iron and three of nodular iron were tested in an oxygen-free atmosphere in both the as-cast and annealed conditions. Effect of growth on physical properties. (P10, Q general, CI)

378-P. Thermal Conductivity and Heat Capacity of Beryllium Carbide. John J. Neely, Charles E. Teeter, Jr., and James B. Trice. *Journal of the American Ceramic Society,* v. 33, Dec. 1, 1950, p. 363-364.

Thermal conductivity was determined within an accuracy of ±200% from 300 to 950° C. Enthalpy and mean heat capacity were determined within 10-15% from room temperature to 1100° C. P11, P12, C-n, Be)

379-P. Oxide Film Formation on the Surface of Metals in Aqueous Solutions and the Evaluation of Their Standard Potentials. II. The Mercury Electrode. S. E. S. El Wakkad and T. M. Salem. *Journal of Physical & Colloid Chemistry,* v. 54, Dec. 1950, p. 1371-1383.

Investigation deals with metallic mercury. From a study of behavior of the electrode in the presence and absence of air after applying a special technique for removal of the oxide film, conditions under which a persistent oxide film is absent from the surface of metallic mercury in aqueous solutions were determined. Only under these conditions can the true thermodynamic standard electrode potential, as well as other electro-chemical properties of metallic mercury, be determined. 25 ref. (P15, R2, Hg)

380-P. Studies on Explosive Antimony. IV. The Heat of Explosion at 40° C. C. C. Coffin and C. E. Hubley. *Canadian Journal of Research,* sec. B, v. 28, Oct. 1950, p. 644-647.

Under certain conditions of concentration, temperature, and current density, Sb may be electrodeposited from $SbCl_3$-HCl solutions in an amorphous form which on heating, scratching, or mechanical shock undergoes a more or less explosive crystallization. This deposit appears to be the only example of a metal which can be obtained in any quantity in the vitreous or supercooled condition. Heat of the "explosive" crystallization of electrodeposited amorphous Sb was directly determined at 40° C. in a modified Bunsen-type calorimeter using benzalacetone as the working substance. (P12, N12, Sb)

381-P. Ferromagnetism and Anti-Ferromagnetism. *Nature,* v. 166, Nov. 4, 1950, p. 777-779.

Proceedings of international conference held at Grenoble, France, in July 1950. About 50 papers were read and discussed. 20 ref. (P16)

382-P. Recent Ideas and Experiments in Magnetism. L. F. Bates. *Proceedings of the Institution of Electrical Engineers,* v. 97, pt. 1, Nov. 1950, p. 340-350.

Newer aspects of the domain theory of ferromagnetism. Experimental apparatus and procedures. "Fir-tree" and "Bitter" patterns formed on single crystals of iron. 16 ref. (P16, SG-n, p)

383-P. On the Hall Effect in Ferromagnetics. Emerson M. Pugh, N. Rostoker, and A. Schindler. *Physical Review,* ser. 2, v. 80, Nov. 15, 1950, p. 688-692.

With precise measurements at magnetic fields well above those required for saturation, it is shown that the Hall electric field per unit current density consists of two distinct parts. Its value averaged between poles is given by $R_0H + R_1M$, where H and M are magnetizing force and average intensity of magnetization, respectively, in the sample. Data for Ni. 10 ref. (P16, Ni)

384-P. The Surface Photoelectric Effect. M. J. Buckingham. *Physical Review,* ser. 2, v. 80, Nov. 15, 1950, p. 704-708.

Theoretical expressions describing photo-electric emission from a metal surface are derived, taking account of the dependence, established by Bardeen, of effective surface barrier on momentum of the impinging electron, due to exchange and correlation forces in the interior. Influence of transmission coefficient of the surface-potential barrier on the photo-electric properties of a metal. An experiment is proposed for determining directly the variation with energy of the transmission coefficient. 11 ref. (P15)

385-P. Theory of Superconductivity. L. Tisza. *Physical Review,* ser. 2, v. 80, Nov. 15, 1950, p. 717-726.

A quantum-mechanical model exhibits the characteristic properties of superconductors. Localized "atomic" wave functions are used to construct many-electron wave functions obeying the exclusion principle and corresponding to definite electronic localization. 38 ref. (P15)

386-P. A Note on Tisza's Theory of Superconductivity. J. M. Luttinger. *Physical Review,* ser. 2, v. 80, Nov. 15, 1950, p. 727-729.

The equation of F. London connecting the electric field and the current in a superconductor is derived on the basis of Tisza's theory of superconductivity. (See above abstract; item 385-P. (P15)

387-P. Hall Coefficient and Resistivity of Thin Films of Antimony Prepared by Distillation. W. F. Leverton and A. J. Dekker. *Physical Review,* ser. 2, v. 80, Nov. 15, 1950, p. 732-736.

An a.c. method for measuring Hall coefficient, and an apparatus for the preparation of very pure evaporated metal films. This apparatus eliminates such sources of contamination as hot filaments. The effect of annealing on both Hall coefficient and resistivity of evaporated films of antimony was examined. A tentative explanation for the observed increase in Hall coefficient and decrease in resistivity, based on assumption of partial recombination of electrons and holes. 18 ref. (P16, Sb)

388-P. The Superconductivity of Columbium. D. B. Cook, M. W. Zemansky, and H. A Boorse. *Physical Review,* ser. 2, v. 80, Nov. 15, 1950, p. 737-743.

Isothermal critical magnetic-field curves and zero-field transitions for several annealed specimens of Cb were measured by an a.c. mutual-inductance method, at temperatures from 5.1° K. to the zero-field transition temperature. Results on a different grade of Cb with a Ta content of 0.4%, according to neutron-scattering measurements, were in agreement with data obtained from Cb containing 0.2% max. Ta. 20 ref. (P15, Cb)

389-P. Theory of Magnetic Properties of Anisotropic Permanent Magnet Alloys. K. Hoselitz and M. McCaig. *Physical Review,* ser. 2, v. 80, Nov. 15, 1950, p. 757-758.

Criticizes theory proposed for the magnetic properties of Alnico V, in a recent letter of Kittle, Nesbitt, and Shockley. (See item 106-P, 1950.) Outlines alternative theory. (P16, SG-n)

390-P. Susceptibility and Magnetic Anisotropy of Indium Single Crystals. J. Verhaeghe, G. Vandermeerssche, and G. Le Compte. *Physical Review,* ser. 2, v. 80, Nov. 15, 1950, p. 758.

Results of measurements on highly purified material. (P16, In)

391-P. Magnetic Momenta and Curie Points of Hexagonal and Cubic Varieties of Cobalt. (In French.) André J. P. Meyer and Pierre Taglang. *Comptes Rendus* (France), v. 231, Sept. 25, 1950, p. 612-614.

Investigated for the ε and γ types of Co. Relationship between magnetic moment and Curie points is established and, on the basis of this equation, Curie points for both types of Co are established. Experimental data prove the validity of the theory. (P16, Co)

392-P. The Thermal Conductivity of "Chroman B2 Mo" at Low Temperatures. (In German.) F. Schmeissner and H. Meissner. *Zeitschrift für angewandte Physik,* v. 2, Oct. 10, 1950, p. 423-424.

Thermal conductivity was determined at temperatures of 88, 70, and 3.9° K. The alloy contains about 60% Ni, 15% Cr, 16% Fe, 2% Mn, and 7% Mo. Data are supplemented by a brief discussion of the possible effect of hardness on thermal conductivity. (P11, Ni)

393-P. Anisotropic Energy Distribution in Nickel. (In Russian.) L. V. Kirenskii. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Sept. 11, 1950, p. 209-211.

Experimentally investigated, especially the first and second constants of anisotropy, in the range between 90° K. and the Curie point, using a monocrystalline specimen of Ni. Technique and data. (P12, Ni)

394-P. Some Applications of Electrochemical Thermodynamics. Marcel Pourbaix. *Corrosion* (Technical Section), v. 6, Dec. 1950, p. 395-404.

Affinity and velocity of an electrochemical reaction, the magnitude and sign of which can be measured. Electrochemical phenomena which can take place on the same metallic surface. This treatment is applied to the behavior of Fe in the presence of aqueous solutions; also to a fundamental study of reactions between hydrogen and some oxidizing substances on a platinum surface reported by Wagner and Traud in 1938. 16 ref.
(P12, P15, R1, Fe)

395-P. Changes in Conductivity of Germanium Induced by Alpha-Particle Bombardment. W. H. Brattain and G. L. Pearson. *Physical Review,* ser. 2, v. 80, Dec. 1, 1950, p. 846-850.

Results of experimental and theoretical study on changes in electrical conductivity. (P15, Ge)

396-P. Anomalous Heat Flow in Superconductors. K. Mendelssohn and J. L. Olsen. *Physical Review,* ser. 2, v. 80, Dec. 1, 1950, p. 859-862.

Measurements of heat flow in the superconductive and in the normal state were carried out on pure Pb and Pb containing a small quantity of Bi. Dependence of heat conduction on magnetic field and temperature was determined. The alloy shows a smaller heat conduction in the intermediate state than in either the superconductive or the normal state. 10 ref. (P11, Pb)

397-P. Periodic Deviations in the Schottky Effect for Tantalum. R. J. Munick, W. B. LaBerge, and E. A. Coomes. *Physical Review,* ser. 2, v. 80, Dec. 1, 1950, p. 887-891.

Periodic deviations from the Schottky law in the thermionic emission from patchy surfaces of Ta and Th on Ta were measured for fields up to 3×10^5 volts cm^{-1}, and at temperatures of 1200 and 1500° K. A method was found for separating periodic deviations from patch effects. 16 ref. (P15, Ta)

398-P. Magnetoresistance of Bismuth at 3000 Megacycles. C. W. Heaps. *Physical Review,* ser. 2, v. 80, Dec. 1, 1950, p. 892-893.

Magnetoresistance for frequencies of 3.5 Mc. was found to be of the same magnitude as for steady direct currents. On the other hand, for long infrared waves (8μ) the magnetoresistance is zero. Using a resonating bismuth cavity and a slotted wave-guide, measurements of standing-wave ratio indicated that magnetoresistance at 3000 Mc. is not more than half as large as for direct currents. (P16, Bi)

399-P. Magnetic Moments and Eddy Currents in Spheres of Superconducting Tin. James J. Fritz, Oscar D. Gonzalez, and Herrick L. Johnston. *Physical Review,* ser. 2, v. 80, Dec. 1, 1950, p. 894-899.

The "frozen-in" magnetic moments produced in superconducting spheres of tin, through demagnetization from fields sufficient to completely or partially destroy their superconductivity, were determined. Both solid tin spheres and spheres filled with non-superconducting material were examined. 14 ref.
(P16, Sn)

400-P. An Empirical Correlation Among Superconductors. J. G. Daunt. *Physical Review,* ser. 2, v. 80, Dec. 1, 1950, p. 911-912.

The correlation is developed on the basis of a tabulated correlation of properties of 9 "soft" superconductors and 2 "hard" superconductors. 21 ref. (P15)

401-P. Note on the Inertia and Damping Constant of Ferromagnetic Domain Boundaries. C. Kittel. *Physical Review,* ser. 2, v. 80, Dec. 1, 1950, p. 918.

Generalizes the Doring equation in order to include the case where intrinsic relaxation frequency of

the substance is high. Applies the device introduced by Becker to the Landau-Lifschitz problem, thereby greatly simplifying the calculation and giving insight into the physical mechanism of wall damping; extends the calculation to cubic crystals. (P16)

402-P. Pressure Dependence of Resistance of Germanium. Julius H. Taylor. *Physical Review,* ser. 2, v. 80, Dec. 1, 1950, p. 919-920.

Experimental data are tabulated. An empirical equation representing the pressure dependence of electrical resistance is developed. (P15, Ge)

403-P. Two Comments on the Limits of Validity of the P. R. Weiss Theory of Ferromagnetism. P. W. Anderson. *Physical Review,* ser. 2, v. 80, Dec. 1, 1950, p. 922-923.

Comments are literally indications of the limits of validity of the theory, and do not detract much from the main achievements of the Weiss method. (P16)

404-P. The Thermodynamics of Substances of Interest in Iron and Steel Making. II. Compounds Between Oxides. F. D. Richardson, J. H. E. Jeffes, and G. Withers. *Journal of the Iron and Steel Institute,* v. 166, Nov. 1950, p. 213-234, 245.

A survey was made of thermal and equilibrium data at present availiable for oxide compounds of interest in iron and steelmaking. Standard free energies of formation of these compounds from their component oxides are calculated up to 2000° C., and results are plotted on free energy vs. temperature diagrams. Equations and sources of data are given for each compound, and limits of accuracy are proposed. Application of these diagrams to slag and similar problems. 134 ref. (P12, D general, Fe, ST)

405-P. The Thermal Conductivity of Tin, Mercury, Indium, and Tantalum at Liquid Helium Temperatures. J. K. Hulm. *Proceedings of the Royal Society,* ser. A, v. 204, Nov. 22, 1950, p. 98-123.

Method in which differential gas thermometers are used to measure the thermal conductivity of metals at low temperatures, with temperature differences of only 0.02° K. in the specimen. Experimental curves show variation of thermal conductivity with temperature between 1.7 and 4.3° K. for pure Sn, alloys of Sn with Hg, pure Hg, alloys of Hg with Cd and In, pure In, and pure Ta, in both superconducting and normal states. Results are subjected to theoretical analysis. 22 ref. (P11, Sn, Hg, In, Ta)

406-P. Influence of Thermomagnetic Treatment on Electrical Resistance of Soft Magnetic Materials. (In Russian.) Ya. S. Shur and I. E. Startseva. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Sept. 21, 1950, p. 473-475.

The fact that cooling of certain ferromagnetics from the Curie point to room temperature in the presence of a magnetic field results in a sharp anisotropy of magnetic properties, especially for 66-Permalloy (66% Ni, 34% Fe), was investigated. (P16, SG-n, Ni)

SECTION Q

MECHANICAL PROPERTIES and TEST METHODS; DEFORMATION

1Q. Note on the Role of Rifting in Cold Work and a Possible Measure of Plastic Deformation. Donald P. Smith. *Journal of Applied Physics,* v. 20, Dec. 1949, p. 1186-1187.

It is believed that plastic deformation of crystalline metallic bodies is accompanied by opening of lattice structure. Various such evidences of "rifting" afforded by the behavior of metals with hydrogen. Some probable connections between rifting and deformation. (Q24)

2Q. Grain Boundary Relaxation and the Mechanism of Embrittlement of Copper by Bismuth. T'ing-Sui Ke. *Journal of Applied Physics,* v. 20, Dec. 1949, p. 1226-1231.

Voce and Hallowes proposed recently that the agent responsible for embrittlement is Bi in the form of thin films at grain boundaries. Internal-friction and elastic-modulus measurements were made on Cu specimens free from and containing Bi up to 0.01% with a frequency of transverse vibration of about 1000 cycles per sec. from −50 to 550° C. Effect of cold work, heat treatment, and rate of cooling were also studied. Results support Voce and Hallowes' theory. However, it appears that the Bi is distributed in a highly heterogeneous manner. (Q23, Q22, Cu)

3Q. X-Ray Diffraction Line Broadening and Strain Hardening. D. Rosenthal. *Journal of Applied Physics,* v. 20, Dec. 1949, p. 1257.

Arguments indicating that broadening is indicative of heterogeneity of strain hardening, rather than of strain hardening itself. (Q24, M22)

4Q. Stress Analysis by X-Ray Diffraction. C. R. Lewis. *Non-Destructive Testing,* v. 8, Fall 1949, p. 18-22.

Mathematical basis and methods used by Chrysler Corp. (Q25)

5Q. New Photo-Grid Method for Sheet Studies. *Aviation Week,* v. 51, Dec. 26, 1949, p. 17-18.

New procedure developed at National Bureau of Standards which gives greater accuracy in judging effects of forming action on high-strength Al alloy. (Q25, Al)

6Q. Plastic Strain and Hysteresis in Drawn Steel Wire. R. S. Brown. *Wire Industry,* v. 16, Nov. 1949, p. 897-899, 901-902; Dec. 1949, p. 981-983, 985-986.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 19B-117, 1949. (Q24, ST)

7Q. The Economic Value of Increase of Modulus of Elasticity in Aluminium Alloys. H. L. Cox and M. J. Windle. *Aircraft Engineering,* v. 21, Dec. 1949, p. 382-383.

Compares normal Al alloys and alloys with increased values of modulus of elasticity for covering the upper surfaces of wings of moderately thick sections, particularly of the smooth-wing type. Comparison is intended to form the basis for design of test panels for experimental verification of the theoretical conclusions. (Q21, T24, Al)

8Q. On the Theory of Strength of Quasi-Isotropic Solids. R. Furth. *Philosophical Magazine,* ser. 7, v. 40, Dec. 1949, p. 1227-1233.

Shows that Bragg's theory of the strength of metals, which is based on the assumption of a block structure of the crystallites; and the author's thermodynamic theory of strength, which is based on the idea of a relationship between breaking and melting; can be related to each other if it is assumed that block structure is an intrinsic feature of the crystal lattice. Some implications of the concept of an "intrinsic block structure" of crystal lattices are discussed. 24 ref. (Q23, M26)

9Q. The Mechanism of Deformation in Metals, With Special Reference to Creep. W. A. Wood and W. A. Rachinger. *Journal of the Institute of Metals,* v. 76, Nov. 1949, p. 237-253.

A study was made of changes in crystalline structure produced at various temperatures when a metal was subjected to the slow rate of strain typical of creep process and also to the relatively rapid rate associated with ordinary mechanical testing. Measurements were also made at the same time of strength under various conditions of deformation. The object was to investigate the relation of deformation by creep to that by slip. Results show that the grains develop a sub-structure of a size determined by temperature and rate of strain. The mechanism of deformation changes from slip to creep as the elements of the sub-structure exceed a certain size. (Q24, Q3)

10Q. Compression Creep Testing. A. H. Sully. *Metal Industry,* v. 75, Dec. 9, 1949, p. 491-492.

New type of apparatus designed for stresses up to 10 tons per sq. in. and temperatures up to at least 1000° C. Typical results. (Q3)

11Q. Wire Strain Gauges: Applications to Tensile, Compression and Fatigue Testing. R. T. Budd and R. J. Parker. *Metal Industry,* v. 75, Dec. 16, 1949, p. 511-514, 521.

Procedures and equipment. (Q25)

12Q. Measurement of Surface Strains in Diaphragms. B. C. Carter, J. C. Ghosh, M. V. C. Sastri, and K. V. Chinnappa. *Engineering,* v. 168, Dec. 2, 1949, p. 581-583.

When metal diaphragms are used in pressure gages, central deflection of the plate is usually measured. However, this method has poor accuracy at high pressures. Recommends use of measurements of surface strains as pressure indicators. Results of experiments designed to determine suitability of such measurements, using resistance-wire strain gages, for indication of pressures. Data for pressures up to 1300 psi. are tabulated and graphed. (Q25)

13Q. Effect of Solute Elements on the Tensile Deformation of Copper. Rolland Sydney French and Walter R. Hibbard, Jr. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Jan. 1950, p. 53-58.

True stress – true strain data for Cu and Cu alpha-solid-solution alloys indicate that strain-hardening coefficient is a function of yield strength but independent of solute element added. Approximately linear relationships were found between yield strength and atomic per cent solute. (Q27, Cu)

14Q. Textures in Cold Rolled Copper and 70-30 Alpha Brass. Walter R. Hibbard, Jr. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Jan. 1950, p. 122.

At 99.993% reduction in thickness point the materials failed completely. No attainable amount of cold rolling will cause the pole figures of cold rolled copper and 70-30 brass to become similar, in spite of the fact that such similarity is predicted by theory. (Q24, F23, Cu)

15Q. Plastic Deformation in the Rolling Process. B. L. Averbach. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Jan. 1950, p. 150-153.

Distribution of principal strains within a bar after a 20% rolling reduction was determined by radiographing a lead grid embedded in a cast-tin bar. Axial and vertical principal strains of about the same magnitude and direction as those reported by others at the surface of a bar were observed in the interior. The principal lateral strain, however, changed from tension at the center of the bar to compression midway between the center and the outside in a section perpendicular to the roll axis. (Q24)

16Q. The Elastic Coefficients of Single Crystals of Alpha Brass. Raymond W. Fenn, Jr., Walter R. Hibbard, Jr., and Henry A. Lepper, Jr. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Jan. 1950, p. 175-181.

Results of static tension and torsion tests. 18 ref. (Q21, Cu)

17Q. Fatigue Tests on Flanged Assemblies. A. R. C. Markl and H. H. George. *Transactions of the American Society of Mechanical Engineers,* v. 72, Jan. 1950, p. 77-84; discussion, p. 84-87.

Stress-intensification factors obtained from fatigue tests of full-scale assemblies of 4-in. flanges of the 300-lb. ASA pressure class, and hence directly applicable to piping flexibility calculations. (Q7)

18Q. Elastic Equilibrium in the Presence of Permanent Set. G. Colonnetti. *Quarterly of Applied Mathematics,* v. 7, Jan. 1950, p. 353-362.

Fundamental and general consideration, with a minimum of mathematics. (Q21)

19Q. Some Implications of Work Hardening and Ideal Plasticity. D. C.

Drucker. *Quarterly of Applied Mathematics*, v. 7, Jan. 1950, p. 411-418..

Points out the severe restriction imposed on possible stress-strain relations by a mathematical formulation of the concepts of work hardening and ideal plasticity. Using this condition, an algebraic derivation and extension of Prager's extension of the Mises plastic-potential function is presented. The meaning of stability of plastic deformation as contrasted with stability of nonconservative systems in general. (Q24)

20Q. The Present State of Development of Experimental Stress Analysis. M. Hetenyi. "Proceedings of the Seventh International Congress for Applied Mechanics", Introduction, 1948, p. 57-74.

Illustrates the type of information that can be derived from examination of fracture surfaces by using a few examples. The advancement of electrical instrumentation and interferometry. Applications of stress analysis in medical research and other fields. 17 ref. (Q25)

21Q. A New Theory of Elasticity and Strength. Henry Brandenberger. "Proceedings of the Seventh International Congress for Applied Mechanics", v. 1, 1948, p. 14-27.

A mathematical analysis. (Q21)

22Q. Concerning the Principle of Saint-Venant. (In French.) Kerim Erim. "Proceedings of the Seventh International Congress for Applied Mechanics", v. 1, 1948, p. 28-32.

A critical interpretation of the above principle, which is an important proposition in the theory of elasticity. Cases where it cannot be applied. (Q21)

23Q. Concerning the Calculation of the Deformation of an Imbedded Elastic Solid. (In French.) Mauro Picone. "Proceedings of the Seventh International Congress for Applied Mechanics"; v. 1, 1948, p. 41-48.

Proposes a new theoretical method. Equations are interpreted for different values of the variables. (Q24)

24Q. Severe Deformations. K. H. Swainger. "Proceedings of the Seventh International Congress for Applied Mechanics", v. 1, 1948, p. 49-60.

Theories leading to linear equations for the analysis of finite placements and strains with elastic, plastic, and flow components in anisotropic bodies and applied normal stress. 24 ref. (Q24)

25Q. A Theory of the Transition From Tough to Brittle Fracture With Special Reference to Velocity Effects in Impact Testing. W. Lethersich. "Proceedings of the Seventh International Congress for Applied Mechanics", v. 1, 1948, p. 61-73.

It was concluded that tough fracture is associated with low impact velocities and brittle fracture with high velocities. The relation between impact strength and velocity is deduced quantitatively but only verified qualitatively by experiment. Relation between tensile strength and rate of loading. 10 ref. (Q23, Q6)

26Q. Plane State of Stress Studied by Use of a Physical Grid. L. E. Grinter. "Proceedings of the Seventh International Congress for Applied Mechanics", v. 1, 1948, p. 139-150.

Procedures of grid analogy and strain justification were used on such problems as plate stresses due to weld shrinkage, stresses due to rectangular notches in thin beams, and gusset plate analysis. (Q25)

27Q. Experimental Investigation of the Post-Buckling Behaviour of Flat Plates Loaded in Shear and Compression. A. van der Neut. "Proceedings of the Seventh International Congress for Applied Mechanics", v. 1, 1948, p. 174-186. (Q28)

28Q. Photoelastic Investigation of the Stress Concentration Caused by Surface Irregularities. A. F. C. Brown and V. M. Hickson. "Proceedings of the Seventh International Congress for Applied Mechanics", v. 1, 1948, p. 269-279. (Q25)

29Q. A New Approach to the Problem of Flow. A. Graham. "Proceedings of the Seventh International Congress for Applied Mechanics", v. 1, 1948, p. 348-351.

A brief mathematical analysis. (Q24)

30Q. Opposite Tension in Adjacent Fibres at Plastic Flow. F. K. Th. van Iterson. "Proceedings of the Seventh International Congress for Applied Mechanics", v. 1, 1948, p. 352-355.

In the solid state, the three principal stresses are in general different at any spot in a strained body; in the liquid state they are equal. Applies this law to the overstraining by torsion of a solid cylindrical bar. (Q24)

31Q. The Interaction Between the Crystals of an Aggregate During Plastic Deformation. W. Boas. "Proceedings of the Seventh International Congress for Applied Mechanics", v. 1, 1948, p. 356-364.

Relation to physical and mechanical properties of metals and alloys. (Q24)

32Q. Some Special Problems of Indentation and Compression in Plasticity. R. Hill. "Proceedings of the Seventh International Congress for Applied Mechanics", v. 1, 1948, p. 365-377.

Boundary-value problems in plane plastic flow, expansion of a semicircular hole in the surface of an infinite medium, and compression of a wedge by a flat die. (Q24)

33Q. The Determination of Static and Dynamic Yield Stresses Using a Hard Steel Ball. R. M. Davies. "Proceedings of the Seventh International Congress for Applied Mechanics", v. 1, 1948, p. 418.

The statical experiment is to find the least force which must be applied to the steel ball to produce a permanent indentation. The dynamical experiment is to find the least normal velocity of impact which gives a similar indentation. Tests were made on mild steel homogeneous armor plate and a very hard Ni-Cr steel. (Q21, ST)

34Q. Concerning a New Method of Pneumatic Amplification and Its Application in Extensometry. (In French.) H. de Leiris. "Proceedings of the Seventh International Congress for Applied Mechanics", v. 4, 1948, p. 121-127.

Despite the complicated mechanism of apparatus using this type of amplification, the results obtained are said to warrant its use. (Q27)

35Q. An Electronic Method for the Measurement of an Electrical Quantity and Its Application to the Indication of Strain. E. H. T. Jackson. "Proceedings of the Seventh International Congress for Applied Mechanics", v. 4, 1948, p. 128-136.

Instrument has a very large effective scale length, suitable for use with electrical resistance strain gages. Application for the measurement of static and dynamic strains. (Q25)

36Q. A Study of Fatigue Phenomena Under Combined Stress. J. A. Sauer. "Proceedings of the Seventh International Congress for Applied Mechanics", v. 4, 1948, p. 150-164.

Investigation of an Al alloy subject to combined alternating stresses, including pure torsion, pure bending, and combinations thereof. Tests were conducted on a mechanical oscillator fatigue machine. S-N fatigue strengths at 10 cycles are plotted on a biaxial combined stress diagram. Results approximate the maximum shear theory of failure. Other fatigue tests performed under conditions of biaxial fatigue stresses. 15 ref. (Q7, Al)

37Q. The Mechanical and Optical Properties of Catalin 800 and Its Suitability as Photo-Elastic Material. C. Mulonas. "Proceedings of the Seventh International Congress for Applied Mechanics", v. 4, 1948, p. 165-179.

Effects of the most common types of creep on stress distribution. Properties at high temperatures. A way to machine Catalin without production of stresses. 23 ref. (Q25)

38Q. The Frictional Properties of Tungsten Carbide. F. T. Barwell and A. A. Milne. "Proceedings of the Seventh International Congress for Applied Mechanics", v. 4, 1948, p. 294-310.

Covers WC, steel, two bronzes and a white metal over an extreme range of hardness. Lubricants used were oleic acid, paraffin oil, and two common lubricating oils. (Q9, SG-m)

39Q. The British 50-Ton Dead Weight Standard of Load Installed at the National Physical Laboratory, Teddington. C. E. Phillips. "Proceedings of the Seventh International Congress for Applied Mechanics", v. 4, 1948, p. 268-277.

Machine is capable of applying tension or compression load from 1¼ to 50 tons, being accurate to about one part in 100,000. (Q27, Q28)

40Q. Use of Electrical Resistance Strain Gauges in the Continuous Measurement of Frictional Force. J. S. Webber and A. A. Milne. "Proceedings of the Seventh International Congress for Applied Mechanics", v. 4, 1948, p. 311-323.

The apparatus. (Q25)

41Q. Strength of Metal Aircraft Elements. Rev. Ed. *Subcommittee on Air Force-Navy-Civil Aircraft Design Criteria, Munitions Board Aircraft Committee,* Document ANC-5a, May 1949, 109 pages.

Data for only the most commonly used materials and elements. With a few exceptions the information is acceptable to the Air Forces, Bureau of Aeronautics of the Navy, and Civil Aeronautics Administration. Methods and formulas for calculating the strength of various structural components. (Q23, T24)

42Q. Elastic Constants and Sound Velocities. III. The Elastic Constants of Uranium. Henry L. Laquer. *U. S. Atomic Energy Commission,* AECD-2606, May 26, 1949, 27 pages.

Well-defined specimens of polycrystalline uranium metal were tested by a dynamic method. Accuracy of measurements is said to be lim-

ited only by the anisotropy and relatively large size of the individual crystallites in the available specimens. 17 ref. (Q21, U)

43Q. Drawn Steel Wire; Plastic Strain and Hysteresis. R. S. Brown. *Iron and Steel,* v. 22, Dec. 1949, p. 629-632.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 19B-117, 1949. (Q24, F28)

44Q. The Seizure of Metals. F. P. Bowden and D. Tabor. *Institution of Mechanical Engineers, Proceedings,* v. 160, Dec. 1949, p. 380-383; discussion, p. 392-402.

See abstract of condensed version in *Engineer,* item 3A-98, 1949. (Q9)

45Q. The Measurement of Kinetic Boundary Friction, or the Experimental Investigation of "Oiliness". J. R. Bristow. *Institution of Mechanical Engineers, Proceedings,* v. 160, Dec. 1949, p. 384-392; discussion, p. 392-402.

Study of the nature of sliding in friction-measuring instruments, in which friction is measured by the deflection produced in an elastic system which presses one surface against another moving surface, have led to the design of an instrument which allows the variation of boundary friction with velocity to be determined at very low velocities. Suggests that curves of coefficient of boundary friction vs. velocity are the correct form in which the results of measurements of kinetic boundary friction should be stated. Results illustrate the influence of temperature, nature of the surfaces, and surface finish on kinetic boundary friction for a variety of lubricants. 14 ref. (Q9)

46Q. The Surface-Roughness of Bearing-Surfaces and Its Relation to Oil Film Thickness at Breakdown. A. Cameron. *Institution of Mechanical Engineers, Proceedings,* v. 161, War Emergency Proceedings No. 48, 1949, p. 73-77; discussion, p. 77-79.

The relation of surface roughness of bearing surfaces to allowable film thickness was studied quantitatively with a simple Michell-pad apparatus. The pads were faced with white metal and run against mild-steel collars. The lubricants studied were water, soap solution, paraffin, and light oil. There is for this system a quantitative relation between total surface roughness of the rubbing surfaces and calculated oil-film thickness both at initial metal-to-metal contact and seizure. (Q9, S15)

47Q. The Stresses in Certain Cylindrical Swept Tubes Under Torsion and Bending. J. J. Thompson and W. H. Wittrick. *Council for Scientific and Industrial Research* (Sydney, Australia), Aeronautical Research Report ACA-43, Jan. 1949, 20 pages.

A method of calculating the stress distribution in a singly symmetrical swept tube of constant trapezoidal section, with booms and stringers, under constant bending and torque. Expressions are derived for determining complete stress distribution. The stress-function solution for a doubly symmetrical rectangular tube with booms only, under an exponentially varying torque is obtained. (Q25)

48Q. Creep of Aluminum Alloys. (In French.) R. Chenigny and R. Syre. *Revue de Métallurgie,* v. 46, Oct. 1949, p. 682-686; discussion, p. 687.

A study of the fundamental characteristics. Method of investigation and data. (Q3, Al)

49Q. Study of Means of Hardness Testing of the Plastic Deformability and Cold Hardenability of Cold-Rolled Zinc. (In French.) P. Bastien and A. Popoff. *Revue de Métallurgie,* v. 46, Oct. 1949, p. 699-709.

Results of experimental and theoretical investigation, showing suitability of the pendulum method for such studies. (Q29, Zn)

50Q. Fatigue Strengths of Sintered Iron. (In German.) Max Hempel. *Stahl und Eisen,* v. 69, Nov. 10, 1949, p. 852-853.

Various factors affecting the mechanical strength. (Q7, Fe)

51Q. Concerning the Relationship of Saturation Value to Strength of Cast Iron. (In German.) Franz Roll. *Neue Giesserei,* v. 36 (new ser., v. 2), Dec. 1949, p. 378-380.

Graphed data show that there is no definite correlation between the amount of carbon plus silicon and the tensile strength of cast iron. (Q23, CI)

52Q. Conversion of Vickers Hardness Into Rockwell C Hardness. (In German.) H. Meincke. *Archiv für Metallkunde,* v. 3, Oct. 1949, p. 354-358.

Points out an error in previously published conversion tables and curves and formulates a mathematical relation to correct and standardize the conversion table. 11 ref. (Q29)

53Q. Strength Studies on Sand-Cast Al-Zn-Mg-Cr-Ti Alloys. (In German.) W. Bungardt and H. Gröber. *Archiv für Metallkunde,* v. 3, Nov. 1949, p. 396-399.

H. Brown described a self-aging Al

alloy containing 5.5% Zn, 0.5% Mg, 0.5% Cr, and 0.2% Ti (*Aero Digest*, May 1943), said to have superior properties. Results of comparative study of this alloy and silumin (7% Si and 0.3% Mg) indicate that while Brown's claims are largely justified, silumin is for many purposes equal, if not superior. (Q23, Al)

54Q. The Damping Properties of Carbon Steels When Stressed in Their Elastic Deformation Range. (In German.) E. Diepschlag and H. Müller. *Archiv für Metallkunde*, v. 3, Nov. 1949, p. 400-406.

Determined for ten different steels ranging in carbon content from 0.06 to 0.93%. The specimens were tested as received and after heat treatment at two different temperatures. Results show that one must distinguish damping phenomena in the plastic deformation range from those in the elastic range, and that damping properties increase with grain size. 28 ref. (Q8, CN)

55Q. Nondestructive Testing of the Al-Mg-Zn Alloy Hy 43 by a Magneto-Inductive Method. (In German.) G. H. Vosshühler. *Metall*, v. 3, Aug. 1949, p. 247-251; Sept. 1949, p. 292-295.

Use of instrument known as the "Durokawi meter". Data on hardness, tensile strength, and electrical resistance of Alloy Hy 43. Brinell hardness and electrical resistance after hardening at 20 and 100° C. are correlated. (Q29, P15, Al)

56Q. Brinell Hardness and Impact Strengths of Several Standard Aluminum Alloys. (In German.) A. Buckeley. *Metall*, v. 3, Oct. 1949, p. 330-331.

Al-Zn-Cn and Al-Si-Cn alloys were tested for the above properties at temperatures up to 200° C. (Q29, Q6, Al)

57Q. The Wear Effect of Sand Blasting on Metals. (In German.) Karl Wellinger. *Zeitschrift für Metallkunde*, v. 40, Oct. 1949, p. 361-364.

In order to determine the relative wear resistance of sand-blast nozzles, the behavior of five different steels was studied. Wear of sand-blasting equipment and parts was found to be partly frictional wear and partly "impact" wear. The magnitude of wear as affected by material, nozzle design, and arrangement. Explains certain phenomena which previously seemed anomalous. (Q9, SG-m)

58Q. Wear Resulting From Sliding Friction. Its Causes and Investigation. (In German.) Otto Hermann Hummel. *Zeitschrift für Metallkunde*, v. 40, Oct. 1949, p. 365-371.

Studied from a crystallographic and metallographic point of view. Testing apparatus and method. Results are critically evaluated. (Q9)

59Q. Concerning the Relationship Between the Hardness Curves and Tensile Strengths of Metals. (In German.) Rudolf Böklen. *Zeitschrift für Metallkunde*, v. 40, Oct. 1949, p. 372-374.

Numerous test values suggest that tensile strengths may be computed from their respective Meyer or Ludwik hardnesses, since the tensile strength vs. hardness ratio is nearly constant and practically unaffected by the hardening effect of the indenter. The average conversion factor of 0.3 for steels and nonferrous metals is unaffected by previous cold working or heat treatment between 20 and 300 or between 370 and 570° C. (Q23, Q29)

60Q. Adsorption Effect During Alternating Torsion in Connection With the Problem of Fatigue of Metals. (In Russian.) P. D. Novokreshchenov, N. E. Markova, and P. A. Rebinder. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 68, Sept. 21, 1949, p. 549-552.

Attempts to establish a law of the adsorption effect during alternating torsion at low frequencies and high amplitudes. Experimental investigation was conducted using thin wires (poly and monocrystalline) 1 mm. in diam. and 10 mm. in length, using oleic acid as surface-active agent. 17 ref. (Q7)

61Q. Some General Laws of the Process of Elastic-Plastic Deformation. (In Russian.) I. I. Gol'denblat. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., Oct. 21, 1949, p. 1005-1008.

Theoretical investigation. Proposes a new generalized formula, which is interpreted for different values of the variables. (Q24)

62Q. A New Criterion of Brittleness and Plasticity of Metals. (In Russian.) G. V. Uzhik. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., Oct. 21, 1949, p. 1037-1039.

Proposes evaluation of the above on the basis of ratio of tensile strength and resistance to shear. Mathematical analysis showing validity of this criterion. (Q23)

63Q. Method of Hardness Testing at High Temperatures. (In Russian.) I. L. Mirkin and D. E. Livshits. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Sept. 1949, p. 1080-1087.

For temperatures above 600° C.

Uses a metal-ceramic indenter, protected from oxidation by a special thermal diffusion treatment. Hardness at high temperature characterizes effect of aging and influence of alloying elements in heat resistant alloys more correctly than hardness at room temperature. Details of apparatus and typical data. (Q29)

64Q. Concerning Calculation of Hardness. (In Russian.) V. K. Grigorovich. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Sept. 1949, p. 1088-1094.

Method is based on determination of the area of the projection of the indentation for all basic types of indenters. This method is distinguished by simplicity of calculation. (Q29)

65Q. Investigation of Cold Brittleness of Steel on the Basis of a Conical Indentation Parameter. (In Russian.) F. S. Savitskii, I. A. Zakharov, and B. A. Vandyshew. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Sept. 1949, p. 1095-1099.

Simple method for evaluating steels with respect to their tendency to brittle fracture on the basis of a linear relationship between the ratios of depth to diameter of indentation and of yield point to yield strength, established for a series of metals. 14 ref. (Q23, ST)

66Q. Fracture of Tough Material in Compression by Shear. (In Russian.) S. I. Gubkin, A. N. Danil'chenko, and V. G. Osipov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Sept. 1949, p. 1100-1101.

Investigated for steel containing 0.19% C, 0.58% Mn, 0.63% Cr, 0.47% Ni, and 0.40% Cu at temperatures between room and 1300° C. It was found that shear fracture may follow two paths: in a plane at an angle of 45° to the direction of the applied force and in a plane parallel to the axis of the applied force at an angle of 45° to the radius. (Q26, AY)

67Q. Apparatus for Testing Materials Under Complex-Stress Conditions. (In Russian.) M. L. Bernshtein, W. M. Onchukov, and I. A. Yarov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Sept. 1949, p. 1136-1138.

Machine which permits testing to be done at room and elevated temperatures under complex-stress conditions—bending plus tension. (Q25)

68Q. Structural Improvement of the Amsler Test Machine (Old-Type). (In Russian.) W. W. Aistov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Sept. 1949, p. 1139-1140.

Wedge device which eliminates the spring of the counterweight and renders unnecessary introduction of correction coefficient in calculation of work expended in fracture of test specimens. (Q27)

69Q. Concerning the Isotropy of Rolled Steel in Relation to Its Tendency Towards Brittle Fracture. (In Russian.) L. A. Glikman and E. M. Shevandin. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Oct. 1949, p. 1218-1228.

Investigated for carbon and Cr-Mo steels. Method of investigation and data. (Q23, CN, AY)

70Q. Experimental Utilization of a "Pulsator" for Endurance Testing of Gear Teeth. (In Russian.) R. S. Nikolaev and L. M. Shkol'nik. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Oct. 1949, p. 1264-1265.

Modified apparatus intended to render conditions of testing more similar to those actually encountered in service. (Q7)

71Q. Evaluating Notch Toughness. R. W. Vanderbeck and M. Gensamer. *Welding Journal*, v. 29, Jan. 1950, p. 37S-48S.

Meaning of transitional behavior for the various types of specimens. Reasons for believing that actual ship behavior is best evaluated by consideration of low levels of energy absorption, and that an evaluation can be readily obtained from keyhole or V-notch Charpy impact values. 25 ref. (Q6, Q23)

72Q. Frictional Properties of Lead-Base and Tin-Base Bearing Alloys. *Product Engineering*, v. 21, Jan. 1950, p. 143-144. Condensed from "The Frictional Properties of Lead-Base and Tin-Base Bearing Alloys", D. Tabor, Council for Scientific and Industrial Research, Bulletin No. 212.

Results of investigation. Data are tabulated. (Q9, Pb, Sn, SG-c)

73Q. Influence of Stress Concentration, Speed of Deformation, and Temperature on the Rupturing Strength of Steels. A. Guessier and R. Castro. *Engineers' Digest*, v. 10, Oct. 1949, p. 350-354; Dec. 1949, p. 412-414. Translated and condensed.

Previously abstracted from *Revue de Métallurgie*. See item 3A-250, 1949. (Q23, ST)

74Q. Friction and Adhesion of Clean Metals. F. P. Bowden and J. E. Young. *Nature*, v. 164, Dec. 24, 1949, p. 1089-1090.

It is well known that development of high friction and ultimately of seizure between rubbing metal surfaces is greatly facilitated by progressive cleaning, particularly in the

final stages. Further experiments show that with clean surfaces complete seizure occurs. (Q9)

75Q. (Book) **Proceedings of the Seventh International Congress for Applied Mechanics, 1948. Introduction.** 129 pages. Imperial College of Science and Technology, South Kensington, London, England.

First of six volumes giving proceedings of a meeting held in London in Sept. 1948. It contains two addresses on turbulent flow, one on experimental stress analysis, an abstract on mathematical theory of plasticity, editor's introduction, complete list of papers, and names of members of the Congress.
(Q general)

76Q. (Book) **Proceedings of the Seventh International Congress for Applied Mechanics, 1948. Vol. 1.** 432 pages. Imperial College of Science and Technology, South Kensington, London, England.

Proceedings of meeting held in London in Sept. 1948 contains about 36 papers in full and 24 in abstract form, dealing with theoretical and experimental approaches to problems of plasticity and elasticity, stress and strain, stresses in structures and shapes, etc. Many of the individual papers are separately abstracted.
(Q general)

77Q. (Book) **Modern Steels and Their Properties; Carbon and Alloy Steel Bars.** 228 pages. 1949. Bethlehem Steel Co., Bethlehem, Pa.

Steelmaking procedure. Effect of size or mass on mechanical properties. (Q general, D general, ST)

78Q. (Book) **The Creep of Metals and Alloys.** E. G. Stanford. Temple Press, Ltd., Bowling Green Lane, London E.C.1, England. 15 s.

Creep testing; the creep curve; metallurgical factors affecting creep; methods for presenting creep-test results; and mechanism of creep.
(Q3)

79-Q. Properties of Through Hardened Steels. *Metal Progress,* v. 57, Jan. 1950, p. 80-B. From "Republic Alloy Steels", 1949 Edition.

Graphs show mechanical properties vs. heat treatment for a series of alloy steels.
(Q general, J general, AY)

80-Q. A New Boron Steel. Tom Bishop. *Metal Progress,* v. 57, Jan. 1950, p. 94, 96.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 3B-262, 1949. (Q23, AY)

81-Q. High-Temperature Fatigue Testing. *Metal Progress,* v. 57, Jan. 1950, p. 96, 98. Translated and condensed from "Method of Testing the Fatigue of Steel Samples at High Temperatures", M. F. Sichikov and Z. D. Vishnevetzkii, *Zavodskaya Laboratoria* (Factory Laboratory), Jan. 1948, p. 86-91.

Previously abstracted from condensed version in *Engineers Digest.* See item 9-108, 1949. (Q7, ST)

82-Q. A Reduction-of-Area Gage for Use at Low Temperatures. Glenn W. Geil and Nesbit L. Carwile. *Journal of Research of the National Bureau of Standards,* v. 43, Dec. 1949, p. 527-532; *ASTM Bulletin,* Jan. 1950, p. 75-78.

A gage for measuring change in diameter of cylindrical or notched tension specimens during tests at controlled temperatures from −196° to +100° C. Measurements can be made with an accuracy of 0.0001 in. Results obtainable are illustrated by true stress–true strain curves for annealed ingot iron, cold worked nickel and cold worked 18-8 Cr-Ni steel. (Q27, CI, SS, Ni)

83-Q. Precision Testing of Gas Turbine Disks. *Automotive Industries,* v. 102, Jan. 15, 1950, p. 40-41.

Apparatus designed for determination of plastic and creep strains at speeds up to 35,000 r.p.m., and temperatures up to 1500° F.
(Q25, Q3)

84-Q. Fundamentals of the Working of Metals. Part VII. Combined Effects of Phase Changes and Forming Speeds. George Sachs. *Modern Industrial Press,* v. 12, Jan. 1950, p. 6, 8, 10.
(Q23)

85-Q. A Note on the Notch Effect of Metals. K. Minamiozi and H. Okubo. *Journal of the Franklin Institute,* v. 249, Jan. 1950, p. 49-55.

Theory of elasticity shows that stress concentration around a diametrical hole of a round bar under tension increases as the diameter of the hole decreases, and when diameter of the hole decreases infinitely, stress-concentration factor approaches 3. On the other hand, fatigue tests show that strength of a bar with a very small diametrical hole does not differ perceptibly from that of a solid one. Classical theory was found insufficient to explain this phenomenon. Presents a new theoretical analysis and experimental results for mild steel, "special steel", and superduralumin.
(Q25, ST, Al)

86-Q. Radiochromium Plating for Friction Studies. John T. Burwell and S. F. Murray. *Nucleonics,* v. 6, Jan. 1950, p. 34-37.

Application of radiochromium to

piston rings for study of the phenomena of friction. (Q9, S19)

87-Q. Stress Distribution in Bridge Frames — Floorbeam Hangers. C. H. Sandberg, J. E. Bernhardt, S. C. Hollister, J. F. Marsh, F. M. Masters, N. M. Newmark, C. Earl Webb, and L. T. Wyly. *American Railway Engineering Association, Bulletin,* v. 51, Jan. 1950, p. 470-504.

Causes and remedies for the failures in floorbeam hangers in railway bridges. Fact-finding survey of failures which have occurred and the analysis of these failures; study of stress distribution in the hangers of selected bridges under service loads, both static and dynamic, and under service conditions, obtained by strain measurements in the field; and study of the stress distribution, under controlled laboratory conditions, in components and models of the hangers and of static and fatigue strength of these components. (Q25, T26, ST)

88-Q. Mechanism of Creep in Metals. G. R. Wilms. *Journal of the American Society of Naval Engineers,* v. 61, Nov. 1949, p. 892-907.

Previously abstracted from *Journal of the Institute of Metals.* See item 4A-60, 1949. (Q3)

89-Q. Investigation of a NACA High-Speed Strain-Gage Torquemeter. John J. Rebeske, Jr. *National Advisory Committee for Aeronautics,* Technical Note 2003, Jan. 1950, 41 pages.

The unit was designed, built, and operated over shaft speeds of 5000-17,000 r.p.m. and torque loads of 250-5500 in.-lb. Precision and accuracy were determined by static calibration and dynamic operation. Methods for overcoming effects of various operating variables. (Q25)

90-Q. Meyer Analysis of Metals. H. M. Finniston, E. R. W. Jones, and P. E. Madsen. *Nature,* v. 164, Dec. 31, 1949, p. 1128-1129.

Results of Meyer hardness analyses for uranium, tin, zinc, and gallium are tabulated along with literature data for common metals and alloys. (Q29)

91-Q. Hot Working; Desirable Qualities in Tool Steels. H. Carr. *Iron and Steel,* v. 23, Jan. 1950, p. 3-7.

Critical discussion of recent work on the influence of various elements on properties of hot work toolsteels. Recommends more work on effect of composition on hot-impact, hot-fatigue, hot-hardness, hot-tensile and hot-wear properties. 17 ref. (Q general, TS)

92-Q. Carbide Distribution as a Possible Cause of Temper Brittleness. L. D. Jaffe. *Journal of the Iron and Steel Institute,* v. 164, Jan. 1950, p. 1-3.

Difficulties of reconciling current theories of temper brittleness of steel with experimental data. A new hypothesis is suggested: that temper brittleness may arise from the effect of temperature, in the subcritical range, upon the quasi-equilibrium distribution of carbides or other phases. If the hypothesis is valid, the phase responsible for temper brittleness cannot be cementite. 24 ref. (Q23, ST)

93-Q. Tessellated Stresses. Part V. F. Laszlo. *Journal of the Iron and Steel Institute,* v. 164, Jan. 1950, p. 5-26.

Continues series of articles (Part IV published in 1945). The currently accepted theory of the influence of strains due to volume change on the shape of precipitates is carefully examined but rejected. Rules giving the true shaping effort of these strains, in terms of elastic constants and yield stress of matrix and precipitate, were determined. Conventional views on dislocation are extended by the idea that the atomic structure must become buckled. This leads to suggestions as regards the interpretation of hardness phenomena. 22 ref. (Q25, N7)

94-Q. X-Ray Investigations of the Behavior of Materials Under Alternating Stresses. (In German.) Alfred Schaal. *Zeitschrift für Metallkunde,* v. 40, Nov. 1949, p. 417-427.

Specimens of alloy steels and light metals previously annealed for stress relief were subjected to static and dynamic alternating stresses and the resulting surface stresses determined by an X-ray method. 27 ref. (Q25)

95-Q. A Statistical Representation of Fatigue Failures in Solids. (In English.) W. Weibull. *Acta Polytechnica* (Mechanical Engineering Series), v. 1, no. 9, 1949; *Transactions of the Royal Institute of Technology,* no. 27, 1949, 51 pages.

Statistical aspects, complete fatigue diagram, S-N curves, P-S curves, size effect, and computation of parameters. Numerical examples. 11 ref. (Q7)

96-Q. Mechanism of Plasticity of Homogeneous Metallic Alloys at High Temperatures. (In Russian.) K. A. Osipov. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR) (Section of Technical Sciences), Sept. 1949, p. 1372-1377.

Theoretical data and experimental investigation of binary and quaternary metallic alloys. A basic mech-

anism is strengthening the nonuniformity of distribution of the components, which may lead to formation of a new phase. (Q23)

97-Q. Effects of Three Interstitial Solutes (Nitrogen, Oxygen, and Carbon) on the Mechanical Properties of High-Purity Alpha Titanium. Walter L. Finlay and John A. Snyder. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Feb. 1950, p. 277-286.

Determined on fusion-alloyed, annealed specimens in comparison with a substitutional solute—iron. A good correlation between bend ductility as well as microtensile properties and Vickers hardness was established for both the binary and ternary alloys of the interstitial solutes. Shows that the element with the lowest solubility has the greatest strengthening effect. Relationship to associated lattice-parameter changes. 22 ref. (Q23, Q29, Ti)

98-Q. Some Effects of Phosphorus and Nitrogen on the Properties of Low Carbon Steel. G. H. Enzian. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Feb. 1950, p. 346-353.

Simultaneous small variations show that the two elements have concomitant effects. Amounts of both elements present must be known to evaluate properly the significance of a change in either. 14 ref. (Q general, CN)

99-Q. The Effects of Molybdenum and Commercial Ranges of Phosphorus Upon the Toughness of Manganese Steels Containing 0.40 pct. Carbon. M. Baeyertz, W. F. Craig, Jr., and J. P. Sheehan. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Feb. 1950, p. 389-396.

Loss in toughness caused by P was studied in AISI-SAE 1340 steel and in molybdenum modifications of this grade. Replacement of part of the Mn by Mo in amounts which maintain hardenability was shown to counteract to a marked degree the detrimental effects. (Q23, AY)

100-Q. Studies in Fundamentals of Plasticity to Aid Design. D. C. Drucker. *Product Engineering,* v. 21, Feb. 1950, p. 128.

Fundamental research program at Brown Univ. sponsored by the U. S. Navy. (Q23)

101-Q. A Torsion Test for Enameled Steel. *Finish,* v. 7, Feb. 1950, p. 44-45, 58-59.

Test which shows good correlation with pre-shipment tests on packaged products and is effective for plant process control. Purpose is to indicate tendency toward enamel cracking as a result of strains commonly encountered during shipment. (Q1, ST)

102-Q. Energy Partition in Isothermal Fracture. Marguerite M. Rogers. *Journal of Applied Physics,* v. 21, Jan. 1950, p. 60-61.

Measurements were made of elastic potential energy and absorbed energy associated with the fracture of four notch specimens of a special Al-killed mild steel by observing, for several values of deformation, the fracture depth and applied dynamic load. Significance of energy partition in macro-fracture phenomena. (Q26, CN)

103-Q. The Yield Phenomena of a Medium Carbon Steel Under Dynamic Loading. F. V. Warnock and D. B. C. Taylor. *Institution of Mechanical Engineers, Proceedings* (Applied Mechanics), v. 161, War Emergency Proceedings No. 51, 1949, p. 165-175; discussion, p. 178-181.

Dynamic tensile tests made to determine the true shape of the stress-permanent-strain curve for rapid straining. Variation of this curve with change in strain rate and progressive deformation of the steel were also studied. Compares dynamic and static stress-strain curves, existence of a "dynamic upper yield stress" and a "dynamic lower yield stress" being shown. Effect of normalizing. A theory for the observed increases in stress. 14 ref. (Q27, CN)

104-Q. The Use of Plumber's Resin To Determine the Occurrence of Yield. J. S. Blair. *Institution of Mechanical Engineers, Proceedings* (Applied Mechanics), v. 161, War Emergency Proceedings No. 51, 1949, p. 176-177; discussion, p. 178-181.

Brittle lacquers used for determination of elastic stress have a number of disadvantages. Plumber's resin provides much the same information more readily and needs only a simple technique. It has the disadvantage that it is necessary to stress the specimen slightly beyond the yield point. Technique of application. (Q25)

105-Q. The Behaviour of a Nominally Isotropic 0.17 Per Cent Carbon Cast Steel Under Complex Stress Systems at Elevated Temperatures. A. E. Johnson. *Institution of Mechanical Engineers, Proceedings* (Applied Mechanics), v. 161, War Emergency Proceedings No. 51, 1949, p. 182-186.

See abstract of "Behavior of Cast

Steel at Elevated Temperatures", *Engineer*, item 3B-173, 1949. (Q25, CN)

106-Q. Evaluation of the Stiffness Coefficients for Beryllium From Ultrasonic Measurements in Polycrystalline and Single Crystal Specimens. Louis Gold. *Physical Review*, ser. 2, v. 77, Feb. 1, 1950, p. 390-395.

Previously abstracted from *U. S. Atomic Energy Commission*, AECD-2644, July 21, 1949. See item 3C-230, 1949. (Q23, Be)

107-Q. Micro-Hardness Testing. E. C. W. Perryman. *Metal Industry*, v. 76, Jan. 13, 1950, p. 23-27.

An illustrated review of procedures and equipment. 20 ref. (Q29)

108-Q. Quality Control of Grey-Iron Castings. J. Leonard. *Foundry Trade Journal*, v. 88, Jan. 19, 1950, p. 71-74.

Extends earlier work on use of the Brinell test in the foundry by correlating results for hardness, tensile, and shear tests on the same irons. A knock-off testpiece of novel design has been developed for casting. (Q29, CI)

109-Q. Properties of Aluminum Alloys at Temperatures Close to That of the Solidus. (In French.) M. W. I. Pumphrey. *Fonderie*, Nov. 1949, p. 1807-1816.

Mechanical properties were investigated for pure Al and Al alloys with Cu, Si, and Fe near the solidus temperature. Tendency toward crack formation at temperatures above the solidus was determined for various concentrations of alloying elements. 12 ref. (Q general, N12, Al)

110-Q. The Effect of Weld Defects in Specimens of Steel St37 on Their Tensile Fatigue Strength. (In German.) Max Hempel and Hermann Möller. *Archiv für das Eisenhüttenwesen*, v. 20, Nov.-Dec. 1949, p. 375-383.

Welds were tested in the longitudinal and transverse direction. Tensile fatigue strength depends on type, number, and size of defects. The fatigue strength of nondefective welds is usually 30-40% lower than that of similar nonwelded specimens. 13 ref. (Q7, K general, CN)

111-Q. Fracture Tendency and Surface Quality of Helical Springs. (In German.) Anton Pomp and Max Hempel. *Archiv für das Eisenhüttenwesen*, v. 20, Nov.-Dec. 1949, p. 385-393.

Purpose of the research was to determine the effect of production conditions on properties of unalloyed and oil-tempered helical steel springs. Each operation in the production of the springs from the steel ingot to finished product was done by a different series of firms, and the finished springs were subjected to fatigue stresses up to a maximum of 10,000,000 cycles. Graphs, tables, and photographs show the results. 24 ref. (Q26, ST, SG-b)

112-Q. Determination of the Creep Strength of Ferrous and Nonferrous Metals. (In German.) Alfred Krisch. *Archiv für das Eisenhüttenwesen*, v. 20, Nov.-Dec. 1949, p. 395-399.

Common methods for determining the high-temperature behavior of metals. The flow curve and the process of determining creep in long and short-time experiments. 70 ref. (Q3)

113-Q. Effect of Extrusion on Structure and Strength of Hardenable Aluminum Alloys. (In German.) H. J. Seemann. *Zeitschrift des vereines Deutscher Ingenieure*, v. 91, Dec. 1, 1949, p. 621-626.

Reviews the literature. Results for various alloys are tentatively classified, and the observed extension effect is explained on the basis of anisotropy due to low-temperature age hardening. Changes in strength properties caused by annealing at elevated temperatures are evaluated. 21 ref. (Q23, Al)

114-Q. Concerning Hardness. (In German.) Eugen Kappler. *Zeitschrift für angewandte Physik*, v. 1, Dec. 1949, p. 564-568.

Values obtained from cylinder-impression and ball-impression methods of hardness testing are not absolute, but depend on test conditions. Proposes a new definition of hardness, dependent only on the elasticity moduli of the material and of the indenter. (Q29)

115-Q. Embrittlement Phenomena in Heat Treated Steels with High Phosphorus. (In Swedish.) E. Houdremont and H. Schrader. *Jernkontorets Annaler*, v. 133, no. 10, 1949, p. 469-501.

Influence of high phosphorus contents on toughness of C and Cr-Ni steels in a hardened and tempered state was investigated. Embrittlement phenomena down to room temperature may be caused by carbide precipitation or by precipitation of phosphide. The extent to which so-called phosphorus embrittlement can be classed with temper embrittlement. 28 ref. (Q23, CN, AY)

116-Q. Relations Between Different Characteristics of Deformation. (In Russian.) V. G. Osipov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Nov. 1949, p. 1339-1342.

Determines relation between conditional relative elongation, conditional relative shear, conditional octahedral shear, true elongation, true

shear, and true octahedral shear. Applications of these relations. (Q21)

117-Q. Technique of Plotting Diagrams of True Stresses. (In Russian.) K. K. Likharev. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Nov. 1949, p. 1343-1347.

New method, taking into consideration the energy absorbed by structural parts of the test machine. (Q27)

118-Q. Plastic Bending. L. A. Shofman and P. I. Lokotosh. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Nov. 1949, p. 1348-1355.

Single calculation formula for determination of bending moment under both cold and hot plastic bending in the region of large deformations. Satisfactory agreement of experimental and calculated values establishes validity of the formula. Possibility of determining yield strength at high temperatures by bending tests. (Q23)

119-Q. Measurement of Sagging Due to Small Loads at the Moment of Structural Transformations in Steel. (In Russian:) N. E. Karskii and T. I. Sobolev. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Nov. 1949, p. 1355-1358.

Apparatus indicates the increased rate of plastic deformation during austenite decomposition in the pearlite, bainite, and martensite regions and also during restoration, recrystallization, and processes taking place during annealing of quenched steel. (Q24, N8, ST)

120-Q. Deformation During Plastic Bending. (In Russian.) I. P. Renne. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Nov. 1949, p. 1359-1364.

Theoretically criticizes conclusions of Romanovskii showing that his formulas cannot be used for determination of minimum bending radius. (Q23)

121-Q. Influence of Test Conditions on the Effect of Adsorption in Facilitating the Deformation of Metallic Monocrystals. (In Russian.) P. A. Rebinder and V. I. Likhtman. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 69, Nov. 11, 1949, p. 219-222.

Monocrystals of Pb, Zn, Sn, and Al were investigated. Mechanism of the effect of adsorbed surface-active agents on deformation. 10 ref. (Q24, P13, EG-a)

122-Q. Effect of 1150° F. Aging on Cr-Mo Steel Castings (2.5 to 9% Cr). N. A. Ziegler and W. L. Meinhart. *Metal Progress*, v. 57, Feb. 1950, p. 203-207.

Tables permit direct comparison of mechanical properties before and after treatment for a series of Cr-Mo steels. Metallographic studies of four 5% Cr steels, two being Ni-free and two containing 2% Ni, were also made before and after aging. (Q general, J27, CI, AY)

123-Q. Abrasion Resistance and Surface Energy of Solid Substances. W. v. Engelhardt. *Industrial Diamond Review*, new ser., v. 9, Dec. 1949, p. 366-369; v. 10, Jan. 1950, p. 19-23. Translated and condensed from *Naturwissenschaften*, v. 33, Oct. 15, 1946, p. 195-203.

Critical discussion of fundamental principles. Techniques for quantitative investigation. Commercial importance. 20 ref. (Q9)

124-Q. Metallographic and Physical Testing Equipment for Foundry Laboratories. *American Foundryman*, v. 17, Feb. 1950, p. 39-40.

List and brief description of necessary equipment. (E general)

125-Q. NACA Friction Studies of Lubrication at High Sliding Velocities. E. E. Bisson and R. L. Johnson. *Lubrication Engineering*, v. 6, Feb. 1950, p. 16-20.

Kinetic friction experiments were conducted on steel specimens with various lubricant films over a range of sliding velocities between 50 and 8000 ft. per min. and loads from 126,000 to 225,000 psi. 12 ref. (Q9, ST)

126-Q. Welding Metallurgy—Iron and Steel. Chapter 6. The Mechanical Properties of Metals. O. H. Henry, G. E. Claussen, and G. E. Linnert. *Welding Journal*, v. 29, Feb. 1950, p. 139-149.

Reprinted from book of same title. (Q general, Fe)

127-Q. Distribution of Relative Ductility in Steel Weldments. L. J. Klingler and L. J. Ebert. *Welding Journal*, v. 29, Feb. 1950, p. 59s-73s.

An investigation was made to determine dependence of zones of low ductility in weldments upon the steel and upon welding conditions and heat treatment. Ductility was evaluated by eccentric notch-bar tension tests conducted at various low temperatures. Occurrence of a zone of low-ductility is thought to be due to some subcritical temperature phenomena which may be the supersaturation and precipitation of carbon or carbides from the alpha phase. (Q23, CN)

128-Q. Effect of Fatigue on Transition Temperature of Steel. J. M. Lessells and H. E. Jacques. *Welding Journal*, v. 29, Feb. 1950, p. 74s-83s.

Tests were made on two ship-

building steels. A combination fatigue-impact specimen was designed. It was round with a circumferential notch and could be tested in impact by sawing off the tapered ends necessary for holding in the fatigue machine. (Q7, CN)

129-Q. Further Study of Navy Tear Test. Noah A. Kahn and Emil A. Imbembo. *Welding Journal,* v. 29, Feb. 1950, p. 84s-96s.

Method for evaluating the susceptibility of steel plate to cleavage fracture. Application to evaluation of notch-sensitivity characteristics of medium and high-tensile ship-plate steels of current production and some special heats of medium steel. Influences of type of steel (process and chemistry), plate thickness, stress-relieving and normalizing, and microstructure. (Q26, CN, AY)

130-Q. Bending of an Ideal Plastic Metal. J. D. Lubahn and G. Sachs. *Transactions of the American Society of Mechanical Engineers,* v. 72, Feb. 1950, p. 201-208.

Stresses and strains in plastically bent parts are analyzed for a very wide plate (plane strain), and a very narrow bar (plane stress). The complete solution is presented for a hypothetical metal with no strain-hardening. Method of application to actual metals. (Q25)

131-Q. Results of Shear Fatigue Tests of Joints With $\frac{5}{16}$-Inch-Diameter 24S-T31 Rivets in 0.064-Inch-Thick Alclad Sheet. Marshall Holt. *National Advisory Committee for Aeronautics,* Technical Note 2012, Feb. 1950, 45 pages.

Riveted joints were made in sheet of Alclad 24S-T3, 24S-T81, 24S-T36, 24S-T86, 75S-T6, 14S-T4, and 14S-T6. Design of the joint gives a wider range of fatigue strengths than does choice of material. (Q7, Al)

132-Q. System of the Relationships of the High-Melting Hexagonal Metals to Magnesium; High-Temperature Alloys Based on Mg-Th-Zr. (In German.) F. Sauerwald. *Zeitschrift für anorganische Chemie,* v. 258, May 1949, p. 296-306.

The alloyability of Be, Cr, Ti, Zr, Mo, Hf, W, Os, Th, and U with Mg was investigated. It was found that Y, Zr, Os, and Th can be readily combined with Mg. Mg-Th-Zr-Ce alloys are not only highly heat resistant but also have the highest known creep-stress resistance of all Mg-base alloys. 11 ref.
(Q3, M24, SG-h, Mg)

133-Q. The Problem of the Effect of Surface Pressure on Fatigue Strength. (In German.) A. Eichinger. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, Jan. 11, 1950, p. 35-39.

Tests made to determine the effect of cold working on the strength properties of carbon steel machine parts show that results depend on a number of preliminary conditions, such as internal stresses, structure of the metals, shape of part, and type of stress. 24 ref. (Q7, CN)

134-Q. Concerning the Bases of the Theory of Strength and Plasticity. (In Russian.) G. V. Uzhik. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Oct. 1949, p. 1433-1455.

Analyzes modern theories. Application to solution of problems connected with determination of strength of materials. (Q23)

135-Q. Deformability of Copper-Zinc Alloys. (In Russian.) S. I. Gubkin and A. B. Simbirskii. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Oct. 1949, p. 1501-1511.

Influence of composition and temperature on mechanical properties and deformability of alloys containing 0.41% Zn. Diagrams are interpreted in terms of optimum temperatures and deforming forces. Value of a mechanical interpretation of constitution diagrams for more extensive development of the theory of alloys is demonstrated. (Q23, Cu)

136-Q. Application of the Method of Microhardness Determination to Solution of Certain Physical Problems. (In Russian.) B. S. Ioffe. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 19, Oct. 1949, p. 1089-1102

Different methods of microhardness determination by indentation. Dependence of microhardness on load applied. Results of investigation of properties of the thin surface layer of metal and of distribution of microhardness in the individual crystal grains are analyzed in the light of the theory proposed by Khrushov and Berkovich. 31 ref. (Q29)

137-Q. Residual Stresses Resulting From Simple Tensile Stress. (In Russian.) E. L. Assur, N. N. Davidenkov, and Yu. S. Terminasov. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 19, Oct. 1949, p. 1107-1118.

Results of experiments performed to verify the effect of Wood and Smith and consisting of measurement by mechanical and X-ray methods of residual stresses in surface layers of plastically deformed Al specimens. It was found that residual stresses exist only in this thin surface layer and are not a property

of the atomic lattice itself, as was indicated by Wood and Smith. (Q25, Al)

138-Q. Strength of Materials. Bevis Brunel Low. 231 pages. 1949. Longmans, Green and Co., 55 Fifth Ave., New York 3, N. Y.

Elementary theory, giving clear and simple explanations with numerous worked examples. Each chapter includes problems. (Q23)

139-Q. (Book) **Werkstoffprüfung.** (Testing of Materials.) **Ed. 3.** F. Grahl. 80 pages. 1949. Carl Hanser Verlag, Munich, Germany.

Standard methods of hardness testing (no reference to microhardness testing); technological tests, particularly those for sheet metal. The spark test for grinding wheels is also mentioned. (Q general)

140-Q. The Interpretation of Biaxial-Tension Experiments Involving Constant Stress Ratios. S. B. Batdorf. *National Advisory Committee for Aeronautics,* Technical Note 2029, Feb. 1950, 25 pages.

The slip theory of plasticity is applied to the problem of calculating strains associated with the above and is found to be in better agreement with experiment than octahedral-shear and maximum-shear theories usually employed. 15 ref. (Q23)

141-Q. On Elastic Constants of Nickel Crystals. Mikio Yamamoto. *Physical Review,* ser. 2, v. 77, Feb. 15, 1950, p. 566.

Compares data of several Japanese investigators with those of Bozorth and collaborators and other workers. (Q21, Ni)

142-Q. SR-4 Strain Gages Offer Exceptional Possibilities in Tensile Fatigue Tests of Assembled Steel Roller Chain. W. V. Covert. *Testing Topics,* v. 5, Jan.-Mar. 1950, p. 9-10.

Procedures. (Q25, Q7)

143-Q. Effects of Low Temperatures on Electric Strain Gages. E. E. Day. *Trend in Engineering at the University of Washington,* v. 2, Jan. 1950, p. 10-15, 32.

Apparatus and procedure. Studies were made from −300 to 60° F. (Q25)

144-Q. Fatigue Strength of Various Details Used for the Repair of Bridge Members. Wilbur M. Wilson and William H. Munse. *Engineering Experiment Station, University of Illinois.* Bulletin Series No. 382, Dec. 1949, 60 pages. (*Bulletin,* v. 47, no. 30.)

Test methods. Specimens are the product of methods used to shorten eyebars, reinforced bridge members, and splice members in service. Includes tables, graphs, diagrams, and photographs. (Q7, T26, CN)

145-Q. The Properties of Weldments at Low Temperatures. Robert D. Stout. "Symposium on Effects of Low Temperatures on the Properties of Materials", *American Society for Testing Materials,* Special Technical Publication No. 78, 1946, p. 51-59; discussion, p. 60-62.

Notch and bend tests made on carbon-steel specimens. Previous work reviewed. (Q5, CN)

146-Q. Creep and Fatigue Tests on Commercially Extruded Lead and Lead Alloy Pipes. J. McKeown and L. M. T. Hopkin. *Metallurgia,* v. 41, Jan. 1950, p. 135-143.

Reproducibility to be expected from materials produced on commercial presses. It is concluded that the effect of alloying additions cannot be determined on extrusions made on presses where variables are not under sufficient control. (Q3, Q7, Pb)

147-Q. The Effect of Homogenising on the Fatigue Properties of an Extruded Al-Cu-Mg Alloy. H. A. Unckel and H. H. Nyander. *Metallurgia,* v. 41, Jan. 1950, p. 155-156. (Q7, Al)

148-Q. The Application of Electrical Strain Gauges and Brittle Lacquers to Engineering Design. J. S. Caswell. *Metallurgia,* v. 41, Jan. 1950, p. 165-170.

Two methods for determining stresses in engineering structures and components. 13 ref. (Q25)

149-Q. Concerning the Critical Shear Stresses of Binary Alloys. (In Japanese.) S. Takeuchi and H. Suzki. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, May 1949, p. 1-5.

New theory of plasticity based on crystallographic relationship between slip and lattice transformation in supercooled or superheated states. Critical shear stresses of Au-Ag, Cu-Ni, and Cu-Zn alloys are calculated and compared with experimental data. (Q24, Au, Ag, Cu, Ni, Zn)

150-Q. Concerning the Influence of Thickness, Base Metal, and Intermediate Layer on Wear Resistance of Chromium Plating. IV. (In Japanese.) Syuzi Ando. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, May 1949, p. 16-19.

Results of a study of a Cr-plated shuttle body (sewing-machine part). A thickness of 5μ or more was required. Mechanism of wear. (Q9, L17, Cr)

151-Q. The Wear Resistance of Chromium Plating. III. The Relation Between Plating Condition and Wear. (In Japanese.) Matsuhei Kishi. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, May 1949, p. 20-23.

The dry-slip wear test was made for specimens of various types in an Amsler machine. It was found that hard Cr plating and gray Cr plating had high wear resistances. Effects of annealing were determined.
(Q9, L17, Cr)

152-Q. Concerning the Difference of Mechanical Properties Between Martempered and Austempered Carbon Steel. I. (In Japanese.) S. Owaku, K. Iijima, and N. Kashiwagi. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, July 1949, p. 29-31.

Experimental results.
(Q general, J26, CN)

153-Q. Young's Modulus of Elasticity of Single Crystals of Cobalt. (In Japanese.) Kotaro Honda and Yuki Shirakawa. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, June 1949, p. 23-25.

Young's modulus was measured for three single crystals by a new room-temperature microscopic method. Voigt moduli were calculated. 11 ref.
(Q21, Co)

154-Q. Residual Stress in Steels Caused by Various Heat Treatments. (In Japanese.) Tadao Sano. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, June 1949, p. 28-34.

Investigated for 0.6 and 0.9% plain-carbon and 0.3-0.9% C, 3% Ni steels. (Q25, CN, AY)

155-Q. Nitrogen as the Alloying Element in Steel. I. Effect of Nitrogen on Temper-Brittleness in Steels. (In Japanese.) Yunoshin Imai and Tetsuro Ishizaki. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Aug. 1949, p. 11-15.

Investigated by impact and hardness testing of low-Mn steels containing various amounts of N_2.
(Q23, AY, N)

156-Q. Comparison of the Properties of Different Heat Resisting Steels. (In Japanese.) Sadao Koshiba and Kosaburo Nobara. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Aug. 1949, p. 25-29.

Thirteen steels were investigated for mechanical properties at room and elevated temperatures, for brittleness caused by heating, and for high-temperature oxidation resistance. Certain recommendations concerning suitable alloys for use in inlet valves of internal-combustion engines are made.
(Q general, R2, T7, AY, SG-h)

157-Q. Bearing Properties of Metals and Alloys. III-IV. (In Japanese.) Koichi Mizuno. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Aug. 1949, p. 29-34.

Part I: Results of a study of anodic films on Al alloys. Effects of Mg, Zn, Si, and Cu. Part II: Effects of thin metallic and nonmetallic films on various bearing metals.
(Q9, L19, SG-c)

158-Q. Studies on the Changes of Various Properties of Metals and Alloys Due to Twisting. I. (In Japanese.) Nubuo Shiota and Chyoei Onozaki. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Aug. 1949, p. 37-39.

A simple twisting machine. Equipment includes electric furnace for studies at elevated temperatures. Typical results showing transformation curves for various nonferrous alloys. (Q1, Cu, Zn, Al)

159-Q. Universal Instrument for Testing Materials by Means of Natural Bar Frequency. Stephan Thyssen-Bornemisza. *Microtecnic* (English Edition), v. 3, Nov.-Dec. 1949, p. 250-259. Translated from the German.

Commercial apparatus made in Germany. Typical data on modulus of elasticity for various metallic and nonmetallic materials obtained by use of this instrument. (Q21)

160-Q. Structural Foils for Greater Strength. R. E. Higgins and G. G. Havens. *Automotive Industries,* v. 102, Mar. 1, 1950, p. 24-26, 52.

Metallic and nonmetallic sandwich structures in which a core of low-density material is bonded between two thin layers of high-strength material. New type of construction known as "Multiwave" in which the core material is crinkled to form a sine wave which is again crinkled to form a second sine wave having approximately ten times greater amplitude. The wave elements are held together by a crinkled ribbon called a "retainer" or "stabilizer". Mechanical test results for a type having an Al core. (L22, Q general, Al)

161-Q. A Reduction-of-Area Gage for Low-Temperature Application. *Technical News Bulletin* (National Bureau of Standards), v. 34, Feb. 1950, p. 24-26.

Previously abstracted from paper by Glenn W. Geil and Nesbit L. Carwile, *Journal of Research of the Na-*

tional Bureau of Standards. See item 82-Q, 1950. (Q27)

162-Q. Residual Lattice Strains in Mild Steel. R. I. Garrod. *Nature,* v. 165, Feb. 11, 1950, p. 241-242.

By using different radiations, Greenough has shown, for a number of metals, that residual lattice strains in plastically extended aggregates are present which vary in both magnitude and sign, depending upon grain orientation. He has also proposed a quantitative hypothesis to explain the results. Experiments were made on mild steel to test this hypothesis. Specimens were subjected to a series of homogeneous, uniaxial tensile loads. After each load, they were removed and examined in a precision X-ray back-reflection camera. (Q25, CN)

163-Q. The Behavior of Long Beams Under Impact Loading. *Journal of Applied Mechanics,* v. 17 (*Transactions of the American Society of Mechanical Engineers,* v. 72), Mar. 1950, p. 27-34.

Theoretical and experimental investigation of plastic deformation of long beams. Deflection characteristics of cold rolled steel and annealed copper beams are computed. Essential difference between the two types of materials. (Q6, CN, Cu)

164-Q. Reduction-of-Area Gage Helps Determine Mechanical Properties of Metals at Low Temperatures. *Steel,* v. 126, Mar. 13, 1950, p. 92-93.

See abstract from *Journal of Research of the National Bureau of Standards,* item 82-Q, 1950. (Q27)

165-Q. Resistance of Six Cast High-Temperature Alloys To Cracking Caused by Thermal Shock. M. J. Whitman, R. W. Hall, and C. Yaker. *National Advisory Committee for Aeronautics,* Technical Note 2037, Feb. 1950, 29 pages.

Modified wedge-shaped specimens were uniformly heated to 1750° F. and subjected to a controlled water quench of one edge. This cycle was repeated until a thermal-shock failure occurred. Order of decreasing resistance to cracking was S-816, S-590, Vitallium, 422-19, X-40, and Stellite 6. (Q26, SG-h)

166-Q. Compressive Properties of Titanium Sheet at Elevated Temperatures. Paul F. Barrett. *National Advisory Committee for Aeronautics,* Technical Note 2038, Feb. 1950, 10 pages.

Results of compressive stress-strain tests from room temperature to 800° F. Favorable compressive properties and marked anisotropy in compression were noted. 12 ref. (Q28, Ti)

167-Q. From a Metallurgist's Notebook: Porous Bronze. H. H. Symonds. *Metal Industry,* v. 76, Feb. 10, 1950, p. 109.

Micro-examination of a phosphor bronze sleeve valve which showed radial score marks on the inclined mating face. Conditions of operation had produced excessive wear, particularly on one portion. The large radial fissures are regions where erosion had progressed to a greater extent due to large gas holes present. (Q9, Cu)

168-Q. Factors Affecting the Strength of Metals at High Temperatures. A. G. Metcalfe. *Metal Treatment and Drop Forging,* v. 16, Winter 1949-50, p. 235-246.

A scheme for classification. By adopting a simplified picture of the mechanism, three groups of methods are obtained: first, those which raise the softening temperature; second, those by which resistance to slip may be raised; third, those which decrease the chance of failure in a grain boundary. Attempts to assess the relative importance of each factor. 48 ref. (Q23, SG-h)

169-Q. Hardness of Cast Iron and Its Relation to Other Mechanical Characteristics. (In French.) Jean Gélain. *Fonderie,* Dec. 1949, p. 1873-1875.

Attempts to correlate hardness with tensile, bending, and impact strengths of cast iron. Dangers of extrapolation which may result in quite large discrepancies between calculated and experimental values. (Q29, CI)

170-Q. Approximate Calculation of the Relationship of the Tensile Strengths of Heat Treated Steels to Their Chemical Composition. (In Italian.) Raffaello Zoja. *Metallurgia Italiana,* v. 41, Sept.-Oct. 1949, p. 229-236.

Two formulas, one approximate and one quite precise. For the latter, some tables have been prepared for convenient interpolation. The formulas were applied to 71 carbon and alloy steels, with good results. (Q23, CN, AY)

171-Q. Calculation of Dimensions of Tensile Test Specimens Cut From Tubes. (In Italian.) F. Bressan. *Alluminio,* v. 18, Nov.-Dec. 1949, p. 609-611.

Proposes an approximate but reliable formula, permitting rapid determination of the necessary size of the test specimen. (Q27)

172-Q. The Problem of Form and Bar-Steel Profiles. (In German.) Bruno Weissenberg. *Stahl und Eisen,* v. 69, Dec. 8, 1949, p. 924-931.

A brief statistical and historical review. Strength and chemical prop-

erties of structural steels used in the construction of buildings, ships, bridges, and railroad tracks. Possibilities of improvement; it is proposed that the number of profiles be reduced and more completely standardized on an international scale. (Q23, S22, CN)

173-Q. Present-Day Problems in the Mechanics of Structures. (In German.) Hans Umstätter. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, Jan. 21, 1950, p. 57-61.

The effect of flow phenomena on such physical properties of metals as toughness, elasticity, shear strength, etc. Relaxation time as a specific variable; elastic and plastic properties of materials; creep phenomena; stress and strain; tough-elastic hysteresis; and the relaxation spectrum. 16 ref. (Q general)

174-Q. The Expansion Measuring Strip: A New Gage for Static and Dynamic Stresses in Solids. (In German.) Kurt Fink. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, Feb. 1, 1950, p. 89-94.

Principles and applications of the electrical-resistance strain gage. 23 ref. (Q25)

175-Q. The Mechanical Properties of Boiler Steels at Elevated Temperatures. (In Swedish.) Gunnar Lilljekvist. *Jernkontorets Annaler,* v. 133, no. 11, 1949, p. 519-540.

Mechanical properties, especially yield points, of 14 Swedish boiler steels were investigated at elevated temperatures. Average yield points at temperatures between −40 and 400° C. are charted. Tensile strength, elongation, and reduction in area are also shown graphically. (Q23, CN)

176-Q. Concerning Indirect Methods of Calculation of True Resistance to Fracture. (In Russian.) A. I. Chilizhenko. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Dec. 1949, p. 1452-1457.

Critically analyzes formulas proposed by several Russian authors. Shows that they are not applicable to previously deformed specimens. Proposes two new formulas, one for annealed metal, the other for cold or hot rolled metal. Data for ferrous and nonferrous metals and alloys are tabulated and charted. 14 ref. (Q26)

177-Q. Concerning Plastic Bending. (In Russian.) V. P. Romanovskii. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Dec. 1949, p. 1459-1467.

Critically analyzes the hypothesis and formula of M. P. Markovets relating to degree of deformation. Ratio between the radius of the mandrel (in the bending test) and thickness of the test specimen are of primary importance. In calculation of the degree of deformation, two different formulas must be used. Both are given and interpreted for different values of the variables. (Q5)

178-Q. Determination of Conditional Limit of Elasticity of Flat Springs Under Pure Bending Stress. (In Russian.) V. Ya. Zubov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Dec. 1949, p. 1486-1487.

Theoretical analysis. Influence of temperature of annealing on steel springs. (Q21, Q5, T7, ST)

179-Q. Two-Prong Indicator for Photographic Recording of Dynamic Stresses. (In Russian.) L. A. Goncharskii. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Dec. 1949, p. 1488-1490.

Sensitive device. (Q25)

180-Q. Method of Experimental Investigation of Shear Deformation. (In Russian.) S. E. Khanin. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Dec. 1949, p. 1492-1494.

Method for experimental determination of tangential stresses during shear resulting in deformations which are determined by a system of mirrors. (Q2)

181-Q. Fatigue Testing of Valve Springs With Surface Defects. (In Russian.) V. B. Raitses. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Dec. 1949, p. 1494-1496.

Types of surface defects and their influence on fatigue strength of valve springs. Test data indicate that the most reliable method for their evaluation is a fatigue test under operating stress for at least 15-17 million cycles. (Q7, T7, AY)

182-Q. Wear Tests on Grinding Balls. T. E. Norman and C. M. Loeb, Jr. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 330-360.

Previously abstracted from *Mining Technology.* See item 3b-58, 1948. (Q9, B13)

183-Q. Discussions of a Century Ago Concerning the Nature of Fatigue, and Review of Some of the Subsequent Researches Concerning the Mechanism of Fatigue. R. E. Peterson. *ASTM Bulletin,* Feb. 1950, p. 50-54; discussion, p. 54-56.

The general state of knowledge of mechanics of materials at the time of a meeting of the Institution of Mechanical Engineers at Birmingham, England, in 1849, and the nature of

fatigue of metals. Some subsequent researches concerning the mechanism of fatigue. 44 ref. (Q7)

184-Q. Large-Scale Torsional Fatigue Testing of Marine Shafting. *Journal of the American Society of Naval Engineers,* v. 62, Feb. 1950, p. 185-201.

Previously abstracted from *Institution of Mechanical Engineers, Proceedings,* 1948. See item 9b-21, 1948. (Q7, T22, ST)

185-Q. Studies on Fly-Ash Erosion. M. A. Fisher and E. F. Davis. *Journal of the American Society of Naval Engineers,* v. 62, Feb. 1950, p. 211-223.

Erosion of turbine blades and other metal parts by fly ash suspended in hot combustion gases, as would occur in pulverized-coal-fired turbines. Special test apparatus designed to simulate operating conditions. Metals used included a carbon steel, cast Vitallium, and several special alloy steels. (Reprinted from *Mechanical Engineering;* see item 3A-31 and 3A-119, 1949.) (Q9, T25, CN, AY, Co)

186-Q. Internal Friction of Cold-Worked Metals at Various Temperatures. T'ing-Sui Ke. *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Mar. 1950, p. 575-580.

Change of internal friction when severely cold worked Al was annealed at successively higher temperatures until it was completely recrystallized. Relationship to temperature of annealing, aging time, and amount of cold work. Effect of impurities. 19 ref. (Q22, N5, Al)

187-Q. Inductance Unit Regulates Fatigue Loads. *Product Engineering,* v. 21, Mar. 1950, p. 100-101.

Vibrating loads as high as 10,000 lb. can be obtained on the Sonntag Model SF-10-U machine. Fatigue tests can be performed on large machine parts and assemblies. Includes means for compensating for load variations caused by permanent deformation of the specimen during test. (Q7)

188-Q. Portable Hardness Testing Device. *Product Engineering,* v. 21, Mar. 1950, p. 103.

Dial-gage device permits rapid, on-the-spot hardness tests on finished assemblies or raw stock. (Q29)

189-Q. Free Machining Steels. *Product Engineering,* v. 21, Mar. 1950, p. 150-151. Condensed from paper by W. Lee Williams.

Previously abstracted from *Journal of the American Society of Naval Engineers.* See item 3B-208, 1949. (Q23, Q6, CN, AY, SG-k)

190-Q. Induflux: New Method for Testing Fatigue in Sucker Rods. D. H. Stormont. *Oil and Gas Journal,* v. 48, Mar. 16, 1950, p. 84, 86.

Apparatus and method indicating relative amount of fatigue and variations in grain structure resulting from heat treating. These conditions and their degree are determined by measurements of differences in magnetic properties. (Q7, ST)

191-Q. Direct Explosion of Welded Joints. G. S. Mikhalapov. *Welding Journal,* v. 29, Mar. 1950, p. 109s-122s.

New technique for determining triaxial sensitivity of steel plates and weldments. Results obtained with numerous combinations of electrodes and low-alloy steels. Typical fractures. (Q26, Q25, K9, CN)

192-Q. Weld Embrittlement in Chromium Stainless Steels. Helmut Thielsch. *Welding Journal,* v. 29, Mar. 1950, p. 126s-132s.

A new type of embrittlement occurring in low-carbon high-chromium irons was investigated using high-temperature furnace quench tests, induction heating techniques, and weld tests. Water quenching or air cooling of Types 405, modified 410 (less than 0.08% C), and 430 stainless irons from temperatures above 2200-2300° F. produces rather abrupt embrittlement and increased hardness. Embrittlement seems to accompany severe grain growth. Hardness values alone do not give a true (relative) indication of other mechanical properties of these irons. With the exception of excessive grain growth, the detrimental effects of overheating may be removed by annealing between 1350 and 1450° F. (Q23, K general, J general, SS)

193-Q. Properties of a Boron Carbide-Iron Ceramal. W. G. Lidman and H. J. Hamjian. *National Advisory Committee for Aeronautics,* Technical Note 2050, Mar. 1950, 23 pages.

Materials containing approximately 13% Fe by volume from 1600-2600° F. were investigated to obtain information on ceramals that form a bonding phase. Room and elevated-temperature modulus of rupture, resistance to fracture by thermal shock, density, and oxidation characteristics were evaluated and compared with those of hot-pressed B_4C. (Q23, H11, B, SG-h)

194-Q. Steel Castings. Test Blocks: A Review of Available Data. H. T.

Protheroe. *Iron and Steel,* v. 23, Mar. 1950, p. 79-84.

Critical analysis of the results of tensile tests from differently designed test blocks. Results indicate that separately cast test pieces are better than those cut from castings. 14 ref. (Q27, CI)

195-Q. Buckling of Compressed Steel Members. Georg Wastlund and Sven G. Bergstrom. *Transactions of the Royal Institute of Technology,* No. 30, 1949, 172 pages.

Reviews fundamental problems met in design. Buckling of centrally compressed bars; combined tension and bending; tests of bars of frames of ST52 steel; proposed Swedish specifications; and built-up compressed chambers. 59 ref. (Q28, ST)

196-Q. Anistropy, Mechanical Properties, and Normalization of Gray Cast Iron. (In French.) Albert Collaud. *Von Roll Mitteilungen,* v. 8, Jan.-Dec. 1949, p. 3-164.

(Q general, J24, CI)

197-Q. Problems of Wear Resistance in Machine Construction. (In Russian.) I. A. Oding. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Dec. 1949, p. 1774-1782.

Trends in machine design requiring higher wear resistance and more accurate determination of operating stresses; also resulting problems of static and dynamic strength, especially at high temperatures, from experimental and theoretical viewpoints. (Q9, Q23, SG-h)

198-Q. (Book) **Manual on Fatigue Testing.** American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Special Technical Publication No. 91, 1949, 82 pages. Cloth cover, $3.15; paper cover, $2.50.

Symbols, nomenclature, testing machines, specimens and their preparation, test procedure, and presentation and interpretation of data. 222 ref. (Q)

199-Q. (Book) **Steels for Elevated Temperature Service.** 87 pages. 1949. U. S. Steel Corp., Pittsburgh.

General principles of behavior. Test methods and laboratory techniques. Tabular and graphical data on mechanical properties of 21 steels covering a wide variety of chemical compositions. Testing facilities of U. S. Steel Corp. 37 ref.
(Q general, ST, SG-h)

200-Q. (Book) **Photo-Elasticity: Principles and Methods.** H. T. Jessop and F. C. Harris. Cleaver-Hume Press, Ltd., 42a, South Audleystreet, London, W.1, England. 28s. net.

Explanation of mathematical ideas and methods involved in the analysis of stress distribution in one plane; optical aspects. Polarization and double refraction; the theory of photoelasticity; the problem of stresses in three dimensions. Various methods of interpetation and reduction of observations which may be used in typical cases. (Q25)

201-Q. Strain Gage Reading at a Glance. *Aviation Week,* v. 52, Mar. 27, 1950, p. 34-35.

Apparatus constructed in England for testing aircraft structures which automatically accepts and displays in rapid succession readings from any number of strain gages. (Q25)

202-Q. The Part of Octahedral Theory in the Study of the Plasticity of Metals. Wendell P. Roop. *Journal of the Franklin Institute,* v. 249, Mar. 1950, p. 223-236.

Somewhat simplified explanation clarified by diagrams. 17 ref. (Q23)

203-Q. Test Bar Results Compared With Tests on Components. A. L. Boegehold, *Metal Progress,* v. 57, Mar. 1950, p. 349-357.

Presents evidence that residual stress is a major cause of the difference between test-bar results and tests on components made from heat treated steel. Indicates need for a large amount of information concerning the relation of hardenability, section size, quenching severity, and tempering procedure to magnitude and direction of residual stress.
(Q25, J26, ST)

204-Q. Russian Opinions on Evaluation of Metals by Mechanical Tests. E. P. Klier. *Metal Progress,* v. 57, Mar. 1950, p. 358-359, 372, 374-375. Based on article in *Zavodskaya Laboratoriya* (Factory Laboratory), v. 14, 1948, p. 446-486.

Results of a survey of opinions of Russian experts on the general character of mechanical properties, evaluation of the structural behavior of materials as a result of mechanical tests, evaluation of fabrication characteristics as a result of mechanical tests, and quality control. Replies of eight individuals are digested.
(Q general)

205-Q. Fundamental Mechanical Properties. *Metal Progress,* v. 57, Mar. 1950, p. 407-409. Translated and condensed.

Previously abstracted from "What Are the Fundamental Properties Necessary to Describe the Mechanical Properties of Materials?", Carl

Benedicks. *Revue de Métallurgie.* See item 3A-92, 1949. (Q general)

206-Q. Creep of Ingot Iron. *Technical News Bulletin* (National Bureau of Standards), v. 34, Mar. 1950, p. 34-35.

See abstract of "Influence of Strain Rate and Temperature on the Creep of Cold-Drawn Ingot Iron", William D. Jenkins and Thomas G. Digges, *Journal of Research of the National Bureau of Standards,* item 3B-220, 1949. (Q3, Fe)

207-Q. Fundamentals of the Working of Metals. Part IX. The Transformation From the Ingot to the Wrought Product—Mechanical Directionality. George Sachs. *Modern Industrial Press,* v. 12, Mar. 1950, p. 6, 8, 42.

Effects of working with respect to differences between mechanical properties measured in different directions. (Q24)

208-Q. The Static Coefficient of Friction and the Area of Contact. R. C. Parker and D. Hatch. *Proceedings of the Physical Society,* v. 63, sec. B, Mar. 1, 1950, p. 185-197.

Apparatus for measuring the coefficient in which the forces tending to disturb the contact area are minimized and which enables the contact area to be viewed throughout the experiment. Surface examination by means of an electron microscope gave results in accord with a cohesive theory of friction, and offer no support for the theory involving formation of welded junctions. 30 ref. (Q9)

209-Q. Properties of Steels Commonly Used for Plastic Molds. *Materials & Methods,* v. 31, Mar. 1950, p. 81.

Qualitative information in tabular form on method of making cavity, type of mold for which suitable, method of hardening, distortion in hardening, hobability, machinability, core strength, case hardness, and wear resistance for a low-carbon and five low-alloy steels. (T5, J28, G17, Q9, T5)

210-Q. Frictional Properties of Porous Metal Impregnated With Plastic. F. P. Bowden. *Research,* v. 3, Mar. 1950, p. 147-148.

Sintered Cu was impregnated with Teflon, giving remarkably low values of friction, which were maintained up to 250-300° C. (Q9, H16, Cu)

211-Q. Methods of Evaluating Hot Malleability of Nickel and High-Nickel Alloys. L. H. Martin and L. O. Bieber. *American Institute of Mining and Metallurgical Engineers,* Institute of Metals Div., Symposium Series, Vol. 2, "Nonferrous Rolling Practice", 1948, p. 15-28; discussion, p. 28-31.

Preparation of test specimens, hot bend tests, hot compression tests, and hot-malleability tests vs. rolling results. Compares various test methods. (Q23, F23, Ni)

212-Q. The Measurement of the Coefficient of Internal Friction of Solid Rods by a Resonance Method. W. Lethersich and H. Pelzer. *British Journal of Applied Physics,* v. 1, Jan. 1950, p. 18-22.

Gives theory and derives expression relating amplitude of vibration to frequency for a rod subjected to alternating mechanical stress. The coefficient of internal friction of the material can be deduced if it is small as, for example, with metals. Physical basis from which the fundamental equations are derived, and the relation between longitudinal and tangential viscosity. (Q22)

213-Q. Improvements in Photo-Elastic Technique Obtained by the Use of a Photometric Method. A. F. C. Brown and V. M. Hickson. *British Journal of Applied Physics,* v. 1, Feb. 1950, p. 39-44.

Photo-electric photometer adapted for use in photo-elasticity. Sensitivity of the instrument is such that a photo-elastic stress pattern can be measured to within $\pm$ 1/500 fringe. Resultant improvements in technique. Apparatus, examples of its use, and factors limiting its accuracy. (Q25)

214-Q. Elastico-Plastic Straining When the Principal Stresses Rotate. K. H. Swainger. *Nature,* v. 165, Mar. 4, 1950, p. 360-361.

Theoretical controversy concerning method of analysis of post-yield straining of metals. (Q25)

215-Q. Meyer Analysis of Metals. Hugh O'Neill. *Nature,* v. 165, Mar. 4, 1950, p. 362.

Variation of ultimate hardness number with Meyer index in the ball indentation test. Several good reasons for associating a decrease in Meyer index with a decrease in work hardening capacity of the metal. However, results were obtained where the Meyer index to the pyramid indentation increased with cold working as compared with a fall in the normal ball test. (Q29)

216-Q. Creep and Fatigue Tests on Commercially Extruded Lead and Lead Alloy Pipes. (Continued.) J. McKeown and L. M. T. Hopkin. *Metallurgia,* v. 41, Feb. 1950, p. 219-223.

Investigation to determine the de-

gree of reproducibility to be expected from materials produced by extrusion on commercial presses. Effect of cold work on Tadanac lead from the pipe press, on alloy of 0.005% Ag + 0.005% Cu, and on 0.015% Te lead. Effect of heat treatment on Tadanac lead from the pipe press. Fatigue tests and results. (Q3, Q7, Pb)

217-Q. 1,000-Ton Testing Machine for Structures. *Engineering,* v. 169, Feb. 24, 1950, p. 207-209; Mar. 3, 1950, p. 237-239.

British equipment intended for fundamental research into the structural components of aircraft. Dimensions were chosen to permit the testing of large sections under compression and tension. (Q27, Q28)

218-Q. The Importance of Surface Oxide Films in the Friction and Lubrication of Metals. Part I. The Dry Friction of Surfaces Freshly Exposed to Air. Part II. The Formation of Lubricating Films on Metal Surfaces. E. D. Tingle. *Transactions of the Faraday Society,* v. 46, Feb. 1950, p. 93-102.

A new "cutting" technique of surface preparation is used to demonstrate effect of the surface oxide film on friction and lubrication of metals. Experiments with lubricated surfaces emphasize the importance of chemical attack in boundary lubrication by fatty acids and demonstrate the essential part played by the oxide film in formation of the lubricating layer. On the basis of the results, lubricating properties of long-chain fatty acids on three main classes of metals are explained. 22 ref. (Q9)

219-Q. Production Quality Control. (In Italian.) Carlo Sapegno. *Metallurgia Italiana,* v. 41, Nov.-Dec. 1949, p. 271-278.

System for steel production based on mechanical-test results on test bars cut from a 150-kg. ingot obtained at the midpoint of the pouring step, and rolled into billets; also on microscopic examination of cross sections of the same sample. Two quality indexes are based on these tests. (Q general, S12, ST)

220-Q. The Use of Surface Pressure in the Clamping of Fatigue Test Bars. (In German.) G. Denkhaus. *Metalloberfläche,* sec. A, v. 4, Feb. 1950, p. 17.

Improved clamping arrangement. (Q7)

221-Q. Visual Strain-Recorder. *Aircraft Production,* v. 12, Apr. 1950, p. 131-132.

New airspeed polygraph equipment which displays information on a large screen. (Q25)

222-Q. Creep Testing Cold Drawn Ingot Iron. *Steel,* v. 126, Apr. 10, 1950, p. 88-90.

Recent studies at National Bureau of Standards which reveal that resistance to fracture increases with an increase in the strain rate. Resistance to creep increased as test temperature decreased. (Q3, Fe)

223-Q. How Metals Fracture. *Product Engineering,* v. 21, Apr. 1950, p. 145-146. Condensed from "The Fracture of Metals", C. F. Tipper.

Previously abstracted from *Metallurgia.* See item 3B-20, 1949. (Q26)

224-Q. New Laboratory Studies Creep and Stress-Rupture. *Industry and Power,* v. 58, Apr. 1950, p. 103-104.

New testing laboratory of Babcock & Wilcox. (Q3, Q4, A9)

225-Q. Six Advantages of Scratch Hardness Testing. John H. Hruska. *Welding Engineer,* v. 35, Apr. 1950, p. 17-19, 22.

Advantages for evaluation of weld characteristics. Two instruments for this purpose—the "sclerometer" and the "Microcharacter"—are described. Photomicrographs show typical scratches. (Q29, K9)

226-Q. Rotor Forgings for Turbo-Generators. J. Novak. *Engineers' Digest,* v. 11, Mar. 1950, p. 72-74. Translated and condensed from *Bulletin des Schweizer Elektrotechnischen Vereines,* v. 40, no. 24, 1949, p. 943-951.

Mechanical properties of rotor forgings, influence of slab size on quality of forgings, influence of microstructure on mechanical properties and faults in the rotor material. (Q general, F22, T25, AY)

227-Q. Study of Crack Propagation Using High Speed Motion Pictures. Herbert I. Fusfeld and Josephine Carr Feder. *Journal of Applied Physics,* v. 21, Mar. 1950, p. 261-262.

Used to observe deformation and rupture in Al and brass at high strain rates. Preliminary studies of fracture were conducted by utilizing flat tensile specimens ½ in. wide and 1/32 in. thick with grids photographically imprinted on a sensitized surface. (Q26, Al, Cu)

228-Q. A High-Sensitivity Torsion Creep Unit. A. E. Johnson. *Journal of Scientific Instruments,* v. 27, Mar. 1950, p. 74-75.

Most data on creep of metals and alloys has been obtained with stresses causing creep rates of 10^{-7} per hr. or more. Describes apparatus for measuring rates as low as 10^{-9} per hr. Legs of the torsion meter are screwed into the ends of the thin-walled tubular test-pieces used. (Q3)

229-Q. Photoelastic Strain Analyzer. E. F. Smith and A. P. Wangsgard. *Journal of Polymer Science,* v. 5, Apr. 1950, p. 169-177.

Principles and apparatus necessary to measure photo-electrically "frozen-in" strains when the material has such a low strain optical coefficient that, at 100% strain and 0.01 in. thickness, less than ½ fringe is produced. Includes nomograph as aid in the calculations. (Q25)

230-Q. Flow of Mild Steel in the Austenite Range, 950-1,400° C. Paul Feltham. *Nature,* v. 165, Mar. 25, 1950, p. 489-490.

Flow of a 0.06% C steel was investigated in vacuum in above temperature range and over ranges of strain rate and stress. Results are discussed from the fundamental viewpoint. (Q24, CN)

231-Q. Surface Deformation and Friction of Metals at Light Loads. J. R. Whitehead. *Proceedings of the Royal Society,* ser. A, v. 201, Mar. 7, 1950, p. 109-124.

Apparatus for friction measurement. Deformation was studied by light and electron microscopy. Cu showed a departure from Amonton's law (proportionality of frictional force to load) at low loads, believed due to an oxide film. Al and Ag did not give this effect, probably because of contrasting oxide properties. Also describes a few experiments on sapphire, diamond, and boundary-lubricated metals. 27 ref. (Q9)

232-Q. Influence of the Elastic Constants on the Partition of Load Between Rivets. W. D. Mitchell and D. Rosenthal. *Proceedings of the Society for Experimental Stress Analysis,* v. 7, no. 2, 1949, p. 17-26.

Previous research shows that the load is not evenly distributed between rivets in a lap joint. An attempt is made to improve the situation by making rivets of material less rigid than the plates. Experimental results did not show expected improvement, because of deformation imposed on the rivets by the plates. SAE 1020 steel, brass, Al, and lucite bolts were used. (Q21, K13, CN, Cu, Al)

233-Q. Energy Losses and Fracture of Some Metals Resulting From a Small Number of Cycles of Strain. T. E. Pardue, J. L. Melchor, and W. B. Good. *Proceedings of the Society for Experimental Stress Analysis,* v. 7, no. 2, 1949, p. 27-39.

A rotating-beam fatigue machine was used for preliminary observations of the behavior of stainless steel, mild steel, Cu, Al, and cast iron subjected to repeated loads sufficiently high to produce failure below 10,000 repetitions of strain. S-N curves show relative strengths. (Q7, SS, ST, Cu, Al, CI)

234-Q. The Strength of Inserted Dies. G. Sachs, J. D. Lubahn, and L. J. Ebert. *Proceedings of the Society for Experimental Stress Analysis,* v. 7, no. 2, 1949, p. 45-72.

Internal pressures required to cause failure of a composite cylinder were determined analytically and experimentally, the latter yielding qualitative agreement with theory. Composite cylinders, each consisting of a hard, brittle insert and a ductile holder assembled with varying initial shrink pressures, were investigated. Shrink pressure is limited by complete plastic flow of the holder or by collapsing of the insert. Tests were made on a number of steels. (Q25, TS)

235-Q. The Stress Distribution in a Simply Supported Beam of I-Section Carrying a Central Concentrated Load. Arnold W. Hendry. *Proceedings of the Society for Experimental Stress Analysis,* v. 7, no. 2, 1949, p. 91-102.

Stress distribution under the load point, photo-elastic tests, and plastic bending of short I-beams. (Q25, CN)

236-Q. New Developments in Dynamic Strain Recording Equipment. Claude M. Hathaway. *Proceedings of the Society for Experimental Stress Analysis,* v. 7, no. 2, 1949, p. 119-126.

Latest improvements and designs; outlines applications and limitations. Includes circuit diagrams and photographs. (Q25)

237-Q. Preliminary Experiments for Testing Basic Assumptions of Plasticity Theories. Roger W. Peters, Norris F. Dow, and S. B. Batdorf. *Proceedings of the Society for Experimental Stress Analysis,* v. 7, no. 2, 1949, p. 127-140.

Experiments on loading conditions in which different plasticity theories predict different plastic behavior. Thin-walled cylinders of 14S-T4 Al alloy were loaded into the plastic range in compression and then twisted. Usefulness of the results for testing the validity of various theories of plasticity. (Q23, Al)

238-Q. Stresses in Keyways by Photoelastic Methods and Comparison With Numerical Solution. M. M. Leven. *Proceedings of the Society for Experimental Stress Analysis,* v. 7, no. 2, 1949, p. 141-154.

Shearing stresses in keyways in shafts subjected to torsion were evaluated for five ratios of keyway

fillet radius to shaft diameter; photo-elastic and numerical solution methods were compared. It is believed that the most promising method of obtaining surface stresses on a body subjected to a general three-dimensional stress system, is that of cutting out a very thin surface section containing the outer surface of the model and then viewing the model perpendicular to the boundary surface. 12 ref. (Q25)

239-Q. A Casting Material for Three-Dimensional Photoelasticity. C. E. Taylor, E. O. Stitz, and R. O. Belsheim. *Proceedings of the Society for Experimental Stress Analysis,* v. 7, no. 2, 1949, p. 155-172.

An allyl ester resin, called Kriston, was used. Techniques and procedures used in casting and testing; mechanical and optical properties. Curves show variation of properties with temperature. 11 ref. (Q25)

240-Q. Bursting of Containers Under Pressure. (In French.) H. de Leiris. *Revue de Métallurgie,* v. 47, Jan. 1950, p. 19-28.

The paradoxical bursting characterized by absence of swelling and accompanied by marked fragmentation is believed to be a manifestation of metallic brittleness. Such fragility cannot be associated with a definite value of impact strength under normal conditions. Necessary strength to avoid possibility of bursting increases with increase in volume of containers and applied stresses. (Q23)

241-Q. Theories and Experimental Data on Creep and Relaxation of Polycrystals. (In French.) Pierre Laurent and Michel Eudier. *Revue de Métallurgie,* v. 47, Jan. 1950, p. 39-52.

Based on the literature and on experimental investigation of Mg and an Al alloy containing 9.7% Cu. Variation of mechanical properties during creep and relaxation. 24 ref. (Q3, Mg, Al)

242-Q. Report of the Commission on Boron Steels of the IRSID. II. Influence of Small Additions of Boron on the Properties of Semi-Hard Carbon Steels. (In French.) R. Potaszkin. *Revue de Métallurgie,* v. 47, Jan. 1950, p. 55-86; discussion, p. 86-87.

Continues comprehensive study on the basis of literature and experimental investigation. Transformations, phase diagrams, mechanical properties, physical properties, and microstructures. Appendix gives extensive test data. (Q general, N8, M24, AY)

243-Q. Fabrication of Cast Iron of High Hardness. (In French.) Gabriel Joly. *Fonderie,* Jan. 1950, p. 1916.

Proposes addition of Ni and Cr to white cast iron for increasing the hardness. Brittleness is also increased, hence the material can only be used for special purposes where this property is not harmful. Compositions and procedures. (Q29, CI)

244-Q. Influence of Columbium on Properties of Nickel-Chromium Steels. (In French.) Y. Okura and J. Omori. *Circulaire d'Informations Techniques,* v. 6, Aug.-Sept.-Oct. 1949, p. 385-394. Translated and condensed from *Tetsu to Hagane* (Japanese), v. 25, Nov. 25, 1939, p. 968-975.

Tabular and graphical data on four Ni-Cr steels containing 0, 1.10, 2.28, and 3.26% Cb. Effects on transformation points, mechanical properties, and corrosion by distilled water, and by inorganic aqueous salt solutions. (Q general, N8, R4, R5, AY)

245-Q. Influence of Contents of Carbon, Chromium, and Tungsten on Mechanical Properties of Certain Valve Steels. (In French.) S. Koshiba and K. Tanaka. *Circulaire d'Informations Techniques,* v. 6, Aug.-Sept.-Oct. 1949, p. 395-399. Translated from *Tetsu to Haĝane* (Japanese), v. 34, Aug. 1948, p. 13-15.

Tabulated and charted data including transformation points and effects of temperatures up to 1050° C. on mechanical properties and oxidation resistance, show that Cr-W steels are as satisfactory for valves used at high temperatures as Cr-Si-W steels. (Q general, T7, AY, SG-h)

246-Q. Plastic Deformation of Cementite in Steel. (In Russian.) B. G. Livshits and B. N. Orlov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Jan. 11, 1950, p. 229-230.

Investigated for a cold-rolled carbon steel of eutectoid composition (0.82% C) annealed to obtain thin laminar pearlite. Polished specimens showed, at 7500×, laminae of cementite compressed by cold rolling. This observation disproves the common assumption that only ferrite is subject to plastic deformation, and that cementite is strictly a brittle phase. (Q24, CN)

247-Q. Effect of Residual Stresses on Fatigue of Compressor Valves. E. W. P. Smith. *Metal Progress,* v. 57, Apr. 1950, p. 480-481.

Valves are blanked from SAE 1065 spheroidized sheet steel, 0.062 in. thick, ball burnished, flattened, heated in a controlled-atmosphere furnace, quenched individually in oil,

and tempered to Rockwell C-44 to 48, then ground and lapped. Residual quenching stress plus the operating stress caused failure in the original production valve. When these stresses were minimized or eliminated by thinning the valve corners, magnitude of the operating stresses alone was below the fatigue limit in an accelerated service test.
(Q7, J26, T7, CN)

248-Q. Tensile Tests of Internally Notched Plate Specimens. Samuel T. Carpenter and Wendell P. Roop. *Welding Journal,* v. 29, Apr. 1950, p. 161s-183s.

Test behavior at various temperatures of internally notched ¾-in. thick, 12-in. wide, low-carbon steel specimens including maximum loads, strain energy, and mode of fracture. Effect of ratio of width divided by thickness of plate. (Q27, CN)

249-Q. The Fracture of Mild Steel. C. F. Tipper. *Welding Journal,* v. 29, Apr. 1950, p. 183s. Condensed from *Iron & Coal Trades Review,* v. 157, 1948, p. 829.

Conclusions resulting from an investigation of causes of large fractures in welded ships.
(Q26, T22, CN)

250-Q. Transition Temperature of Ship Plate in Notch-Tensile Tests. E. M. MacCutcheon, C. L. Pittiglio, and R. H. Raring. *Welding Journal,* v. 29, Apr. 1950, p. 184s-194s.

Comprehensive study of steels following new specifications used in ship construction, together with some experimental steels; and an evaluation of specimens used in determining notch toughness and transition temperatures of steel for ship construction. 13 ref. (Q23, T22, CN)

251-Q. Axial Tension Impact Tests of Structural Steels. W. H. Bruckner and N. M. Newmark. *Welding Journal,* v. 29, Apr. 1950, p. 212s-216s.

Supplementary tension-impact tests were made with specimens of two killed steels and a rimmed steel, at different levels of initial energy. The data show that for the killed steels the transition temperature decreases with decreasing initial energy, but for the rimmed steel there is little change in transition temperature with change in initial energy of impact. (Q6, CN)

252-Q. Prejudging Low Carbon Drawing Quality Sheets. E. F. Lundeen. *Steel Processing,* v. 36, Apr. 1950, p. 186-188, 213.

Various test methods used to determine suitability for drawing or pressing into a particular shape. Production and inspection methods at the sheet mill.
(Q23, G4, S general, CN)

253-Q. An Investigation of the Weavability of Wire With Observations on the Defects of Wire and Wire Cloth. Part II. Walston Chubb, Jr. *Wire and Wire Products,* v. 25, Mar. 1950, p. 222-225, 248.

Special test procedures, including a transverse crimp-sensitivity test. Typical data are charted. (To be continued.) (Q5)

254-Q. Fundamentals of the Working of Metals. Part X. Effects of Hotworking and Coldworking on Grain Structure. George Sachs. *Modern Industrial Press,* v. 12, Apr. 1950, p. 6, 8, 44.

Clarified by diagrams. (Q24)

255-Q. Properties of ZK60—A Magnesium Extrusion Alloy. *SAE Journal,* v. 58, Apr. 1950, p. 69. From "ZK60: An Improved Magnesium Extrusion Alloy", by E. H. Schuette.

Alloy ZK60 contains about 5.7% Zn and 0.6% Zr. The latter has a grain-refining effect which increases strength and ductility. Physical and mechanical properties, and uses.
(Q general, P general, Mg)

256-Q. Effect of Manganese on Steel: Literature Report No. 3. C. V. Narayanswamy and B. R. Nijhawan. *Journal of Scientific & Industrial Research,* v. 9, Feb. 1950, p. 52-55.

A review dealing mainly with mechanical properties. 18 ref.
(Q general, AY)

257-Q. The Thermodynamics of Plastic Deformation and Generalized Entropy. P. W. Bridgman. *Reviews of Modern Physics,* v. 22, Jan. 1950, p. 56-63.

A theoretical discussion.
(Q24, P12)

258-Q. Stress and Strain Concentration at a Circular Hole in an Infinite Plate. Elbridge Z. Stowell. *National Advisory Committee for Aeronautics,* Technical Note 2073, Apr. 1950, 14 pages.

Formulas for the above under tension were derived for use in the plastic region. Values obtained are in good agreement with limited tests on 24S-T3 Al-alloy panels. (Q27, Al)

259-Q. Strength of Metal Aircraft Elements. *Munitions Board Aircraft Committee,* ANC-5a, May 1949, 109 pages.

Mechanical properties of alloy, carbon, stainless, bearing, heat resistant, and corrosion resistant steels, as well as Al and Mg alloys. 52 ref.
(Q23, AY, CN, SS, SG-c,g,h, Al, Mg)

260-Q. Distinction Between Apparent Elastic Limit and Limit of Magnetic Reversibility of Steel Under Tensile Stress. (In French.) André Langevin, Emmanuel Paul, and Marcel Reimbert. *Comptes Rendus* (France), v. 230, Feb. 20, 1950, p. 715-717.

Investigation of a specimen subjected to gradually increasing tensile stress revealed, on the basis of data obtained by mechanical and magnetic measurement, the presence of an intermediate region characterized by residual elongation of the order of 10^{-6} to 10^{-4} in relative value. This region is located between the limits of magnetic and mechanical reversibility, and the limit of apparent elasticity. Method of investigation, circuit diagram of apparatus, and graph of the correlated results. (Q27, P16, ST)

261-Q. Energy Conditions and Changes in Deformation and Fracture. (In German.) Emil Podszus. *Zeitschrift für Metallkunde,* v. 41, Jan. 1950, p. 23-31.

Shows that only about 1% of the energy applied to deformation and fracture of a piece of material is absorbed by the material, while the remainder is evolved as heat. This heat—which can affect the material the same as heat treatment and may even exceed the melting point of the material—is said to be responsible for the difference between theoretical and the actual mechanical properties of worked materials. 16 ref. (Q general)

262-Q. Diagrammatic Representation of Displacements in Three-Dimensional Lattices. (In German.) Albert Kochendörfer. *Zeitschrift für Metallkunde,* v. 41, Feb. 1950, p. 33-36.

Diagrams show lattice conditions in crystals with longitudinal and transverse displacements. The combination of slip with the motion of these displacements is explained. Proposes that the terms "step and screw displacement" be replaced by "longitudinal and transverse displacement" since the latter terms are believed to be more expressive of actual behavior. 18 ref. (Q24)

263-Q. Textures and Their Effects in Sheets of 50-50 Nickel-Iron Alloy. (In German.) Erich Schmid and Hans Thomas. *Zeitschrift für Metallkunde,* v. 41, Feb. 1950, p. 45-49.

The above alloy was cold rolled from 6 to 0.35 mm. and its structure studied by an X-ray method. Tests showed that tensile strength is little affected by orientation of the grains while modulus of elasticity is lowest at an angle of 45° to the rolling direction. 17 ref. (Q24, Ni, Fe)

264-Q. Improvement of the Brinell Tester. (In Russian.) P. K. Kut'kov. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Jan. 1950, p. 28.

Adaptation of a device for bend testing standard specimens of cast iron. (Q29, Q5, CI)

265-Q. (Book) **Strength of Materials. Ed. 7.** F. V. Warnock. Sir Isaac Pitman and Sons, Ltd., Pitman House, Parkerstreet, Kingsway, London, W.C. 2, England. 15s.

Theory of stresses and strains and mechanical properties of metals. Theory is applied to the cases of thin cylinders, spheres, and pipes. A chapter on moments of inertia and the ellipse of inertia precedes five chapters dealing with various aspects of beam theory. Equipment and procedure for testing materials. Creep of metals with special reference to the effect of carbon, molybdenum, and other elements. A new chapter has been added on principles of photo-elastic stress analysis. (Q general)

266-Q. (Book) **Deformation and Flow; An Elementary Introduction to Theoretical Rheology.** Markus Reiner. 346 pages. 1949. H.K. Lewis & Co., Ltd., London.

Basic concepts and numerical examples of application of theory. 5-page bibliography. (Q24)

267-Q. An Improved Magnesium Alloy. *Iron Age,* v. 165, Apr. 20, 1950, p. 90.

Mechanical properties and aircraft uses of extrusion alloy designated as ZK60, containing 6% Zn and 0.6% Zr. (Q general, T24, Mg)

268-Q. Low Temperature Energy Absorbing Properties of High Tensile Steel Improved by Normalizing. *Steel,* v. 126, Apr. 24, 1950, p. 76.

Results of U. S. Navy experiments showing resistance to brittle-type failures. A striking change in ferritic grain size occurs as a result of normalizing. (Q23, J24, AY)

269-Q. An Investigation of the Weavability of Wire With Observations on the Defects of Wire and Wire Cloth. Parts III and IV. Walston Chubb, Jr. *Wire and Wire Products,* v. 25, Apr. 1950, p. 300-305, 308-10, 329-326; May 1950, p. 407, 410-411, 453.

Various types of steel wire defects which cause trouble during the weaving of wire cloth and screen. Brittleness, uneven color, and uneven temper or stiffness. Investigation of six cases of poor weavability

caused by improper annealing and two caused by grain segregation, using the transverse-crimp-sensitivity test previously described and also metallographic examination. Specifications in use and recommended for the different types of steel, monel, and brass wire. Concluding installment: Summary, glossary, bibliography. 85 ref. (Q23, Q5)

270-Q. New Diamond-Indentation Hardness-Testing Method Saves Time and Cuts Costs. Paul Grodzinski. *Instruments,* v. 23, Apr. 1950, p. 343-344. (Q29)

271-Q. A Hydraulic Static Testing Apparatus. J. K. Haviland and G. F. W. McCaffrey. *Aircraft Engineering,* v. 22, Apr. 1950, p. 100-103.

Canadian equipment for strength tests on wings and other large structures. (Q23)

272-Q. Testing a Cycle Frame. *Light Metals,* v. 13, Apr. 1950, p. 175-182.

Methods and results of investigation of dynamic and static properties of an Al-alloy bicycle frame on the test bench and on the road. Includes strain-gage records. (Q25, T10, Al)

273-Q. Metal Buster. *Chemical Industries,* v. 66, Apr. 1950, p. 532.

New creep and stress-rupture equipment of Babcock and Wilcox Co., Alliance, Ohio. (Q3, Q4)

274-Q. Relaxation Methods Applied to Problems of Plastic Flow. I. Notched Bar Under Tension. J. A. Jacobs. *Philosophical Magazine,* ser. 7, v. 41, Apr. 1950, p. 349-361.

Consequences of the Mises-Hencky criterion for plastic strain; the effect of plastic straining is traced by application of a numerical method due to Allen and Southwell. Three problems are considered: two-dimensional slit tension member: a sharpended bar under specified edge tractions; and uniform compression of a block between two smooth, rigid plates which do not overlap it. 12 ref. (Q24)

275-Q. Intrinsic Block Structure and the Strength of Metals. M. S. Paterson. *Philosophical Magazine,* ser. 7, v. 41, Apr. 1950, p. 410.

Criticizes recent paper "On the Strength of Quasi-Isotropic Solids", by R. Furth, which discusses the idea of an "intrinsic block structure". Doubts whether mechanical properties of a metal are influenced by the structure proposed by Furth. Fundamental difference between Bragg's and Furth's theories. (Q23, M27)

276-Q. The Elastic Constants of Germanium Single Crystals. W. L. Bond, W. P. Mason, H. J. McSkimin, K. M. Olsen, and G. K. Teal. *Physical Review,* ser. 2, v. 78, Apr. 15, 1950, p. 176.

Data are tabulated. (Q21, Ge)

277-Q. Young's Modulus as a Function of Wire Diameter. George C. Kuczynski. *Nature,* v. 165, Apr. 8, 1950, p. 562-563.

Young's moduli of Cu, Ni, Pt, and W wires of various diameters were determined. For copper, Young's modulus of an annealed wire was found always to be lower than that of the wire of the same radius but in the cold worked condition. Tungsten, because of its elastic isotropy, showed no variation in modulus. Large variations in the modulus of elasticity of some face-centered metals with diameter and heat treatment are due to their elastic anisotropy and changes in their textures. (Q21, Cu, Ni, Pt, W)

278-Q. Effect of Incidental Elements on Carbon-Steel Plates. J. G. Althouse *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 264-277.

Plate steels from all sections of the country with high and low content of incidentals were subjected to tests. Results show trends in mechanical properties as related to incidental content. (Q general, CN)

279-Q. Creep Resistance of Aluminum Alloys. (In French.) Raymond Chevigny and Robert Syre. *Revue de l'Aluminium,* v. 27, Feb. 1950, p. 43-47.

Previously abstracted from *Revue de Métallurgie.* See item 48-Q, 1950. (Q3, Al)

280-Q. Segregation and Strength Properties of a Forging From a 56-Ton Ingot. (In German.) Sepp Ammareller. *Stahl und Eisen,* v. 70, Feb. 16, 1950, p. 125-132; discussion, p. 132-133.

Investigated on a generator rotor of Mn-Mo steel that had been in operation for 3½ yrs., using various metallographic procedures. Effect of segregation was studied by making tensile notch-impact and fatigue tests on specimens cut in radial, tangential, and longitudinal directions to the rotor. 11 ref. (Q23, M21, CN)

281-Q. Instrument for Recording Shrinkage Stress Vs. Temperature Curves of Metals. (In German.) Hans Scholz. *Archiv fur das Eisenhuttenwesen,* v. 21, Jan.-Feb. 1950, p. 43-47; discussion, p. 48.

Design, operation, and results.

The instrument can be used to study various metallurgical problems, such as the creep resistance of steels. 27 ref. (Q3, Q25)

282-Q. Fatigue Strength and Notch-Effect Factors of Unalloyed and Alloyed Structural Steels at +20 and −78° C. (In German.) Anton Pomp and Max Hempel. *Archiv fur das Eisenhuttenwesen,* v. 21, Jan.-Feb. 1950, p. 53-66.

Study was made by testing 36 steels under static, impact, and fatigue stresses. The bars were tested with and without circular V-notches. Testing procedures and results. 24 ref. (Q7, CN, AY)

283-Q. Notch-Impact Toughness and Fatigue Strength of Various Notched and Unnotched Steels Under Tensile Stress. (In German.) Anton Pomp and Max Hempel. *Archiv fur das Eisenhuttenwesen,* v. 21, Jan.-Feb. 1950, p. 67-76.

Correlates values reported in the literature for various carbon and alloy steels, showing that there is no generally valid relation between fatigue strength and notch-impact toughness. Results were supplemented with fatigue tests made on notched and unnotched specimens. 46 ref. (Q7, CN, AY)

284-Q. The Effect of Metals on the Coefficient of Friction of Lubricants. (In German.) Hermann Jentzsch. *Erdöl Und Kohle,* v. 3, Mar. 1950, p. 124-127.

A simple and accurate method for determining the above. Typical data are tabulated and charted. (Q9)

285-Q. Periodic Mechanical Properties of the Elements. (In Russian.) B. B. Gulyaev. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Feb. 11, 1950, p. 797-799.

Graphs show relationships of mechanical properties of metallic elements (similarly heat treated) to each other, to location in the periodic system, and to atomic structure. (Q general, M25)

286-Q. Systematic Investigation of the Rate and Temperature Dependence of Resistance to Deformation of Single-Phase Metals. (In Russian.) L. D. Sokolov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Feb. 11, 1950, p. 839-841.

Investigation for Pb, Sn, and Cu from room temperature up to their respective melting points and for various rates of deformation. (Q23, Pb, Sn, Cu)

287-Q. Chromium Plate Affects Fatigue Limit of Steels. *Product Engineering,* v. 21, May 1950, p. 89.

Results of recent research at National Bureau of Standards. Specimens were machined from three lots of SAE X4130 rod and one lot of 6130 rod. After grinding, polishing, and chromium plating, the specimens were subjected to fatigue tests. In all cases, chromium plating was found to reduce fatigue limits. (Q7, L17, AY)

288-Q. Analysis of Lugs and Shear Pins Made of Aluminum or Steel Alloys. F. P. Cozzone, M. A. Melcon, F. M. Hoblit. *Product Engineering,* v. 21, May 1950, p. 113-117.

Method of stress analysis and procedure for design of lug-pin combinations made of Al or steel alloys. Constructions analyzed include lugs of irregular section and lug-pin combination assemblies having multiple shear connections. (Q25, T7, Al, ST)

289-Q. Trick Metals May Improve Strength of Steels. *Product Engineering,* v. 21, May 1950, p. 138.

Brief and elementary discussion of Andrade's work on single-crystal wires and rods, which have unique properties concerned with slip and twinning. (Q24)

290-Q. High Temperature Testing Machine. *Product Engineering,* v. 21, May 1950, p. 148-149. Condensed from "A High-Speed, High-Temperature Precision Testing Machine for Gas Turbine Disk Research", A. C. Hagg, B. Cametti, and G. O. Sankey, presented before Society for Experimental Stress Analysis.

Gas turbine disk tester for the determination of plastic and creep strains at temperatures up to 1500° F. and rotational speeds up to 35,000 r.p.m. (Q23, Q3, T25)

291-Q. Nature of Fatigue of Metals. R. E. Peterson. *Mechanical Engineering,* v. 72, May 1950, p. 371-375.

See abstract of "Discussions of a Century Ago Concerning the Nature of Fatigue, and Review of Some of the Subsequent Researches Concerning the Mechanism of Fatigue," *ASTM Bulletin,* item 183-Q, 1950. (Q7)

292-Q. Investigations Into the Impact Strength of Iron and Steel. J. D. Fast. *Philips Technical Review,* v. 11, Apr. 1950, p. 303-310.

Deals not only with matters of common knowledge such as execution and significance of the notched-bar impact test and elementary concepts of stress and fracture, but also with original measurements by

means of which the impact value of pure iron was determined as a function of temperature, and of oxygen, carbon, and nitrogen content. (Q6, Fe)

293-Q. Stress-Strain and Elongation Graphs for Aluminum-Alloy 75S-T6 Sheet. James A. Miller. *National Advisory Committee for Aeronautics,* Technical Note 2085, Apr. 1950, 37 pages.

Results of tests on duplicate longitudinal and transverse specimens with thicknesses of 0.032, 0.064, and 0.125 in. are plotted. Stress-strain, stress-deviation, tangent-modulus, and auxiliary graphs are plotted on a dimensionless basis. 11 ref. (Q27, Al)

294-Q. The Tensile Impact Properties of Some Metals and Alloys. D. S. Clark and D. S. Wood. *Transactions of American Society for Metals,* v. 42, 1950, p. 45-74.

Results of tests in which force-time relations are determined can be placed on a rational basis through the concept of the theory of plastic strain propagation. Tests were made on ingot iron, carbon steels, alloy steels, stainless steel (Type 302), Cu, Al, Al alloys, Mg alloys, and a Zn die-casting alloy. Influence of different heat treatments on static and tensile impact properties of some steels. Ultimate strength, percentage elongation, and energy absorption under both static and dynamic conditions are plotted for all materials. Advantages and disadvantages of a quench and temper treatment and an austempering treatment. 12 ref.
(Q27, CI, CN, AY, SS, Cu, Al, Mg, Zn)

295-Q. Effect of Boron and Kind of Boron Addition Upon the Properties of Steel. R. A. Grange, W. B. Seens, W. S. Holt, and T. M. Garvey. *Transactions of American Society for Metals,* v. 42, 1950, p. 75-105; discussion, p. 105-111.

Previously abstracted from Preprint. See item 3B-196, 1949.
(Q general, B22, J26, AY)

296-Q. Formability of Various Alloys for High Temperature Service. John F. Tyrrell. *Transactions of American Society for Metals,* v. 42, 1950, 405-438.

Plastic flow characteristics of 8 Fe, 5 Ni, and 4 Co-base alloys were studied in tensile tests, cup tests, drop-hammer forming, and deep-drawing tests. Results were correlated to give comparative formability ratings. 13 ref.
(Q23, GS-h, Fe, Ni, Co)

297-Q. Tensile Properties of a Heat Treated Low Alloy Steel at Subzero Temperatures. E. J. Ripling. *Transactions of American Society for Metals,* v. 42, 1950, p. 439-452; discussion, p. 452-454.

Previously abstracted from Preprint. See item 3B-194, 1949.
(Q27, J29, AY)

298-Q. Transverse Ductility Variations in Large Steel Forgings. Edward A. Loria. *Transactions of American Society for Metals,* v. 42, 1950, p. 486-498.

Relation of transverse reduction of area and quality with ingot size and forging reduction. Effect of sulphur. (Q27, F22, ST)

299-Q. A Study With New Equipment of the Effects of Fatigue Stress on the Damping Capacity and Elasticity of Mild Steel. B. J. Lazan. *Transactions of American Society for Metals.* v. 42, 1950, p. 499-549; discussion, p. 549-558.

Previously abstracted from Preprint. See item 3B-204, 1949.
(Q7, Q8, CN)

300-Q. Effect of Steady Stress on Fatigue Behavior of Aluminum. J. A. Sauer and D. C. Lemmon. *Transactions of American Society for Metals,* v. 42, 1950, p. 559-575; discussion, p. 575-576.

Previously abstracted from Preprint. See item 3D-65, 1949.
(Q7, Al)

301-Q. A Bar Bend Test and Its Application to Stainless Steel. C. A. Zapffe, R. L. Phebus, and F. K. Landgraf. *Transactions of American Society for Metals,* v. 42, 1950, p. 666-684; discussion, p. 684-685.

Previously abstracted from Preprint. See item 9-268, 1949.
(Q5, SS)

302-Q. Unnotched Impact Strength of High Speed Steels. Arthur H. Grobe and George A. Roberts. *Transactions of American Society for Metals,* v. 42, 1950, p. 686-707; discussion, p. 707-719.

Previously abstracted from Preprint. See item 3B-195, 1949.
(Q6, TS)

303-Q. On the Extrapolation of Short-Time Stress-Rupture Data. Nicholas J. Grant and Albert G. Bucklin. *Transactions of American Society for Metals,* v. 42, 1950, p. 720-751; discussion, p. 751-761.

Previously abstracted from Preprint. See item 3A-197, 1949.
(Q4, SS)

304-Q. The Elastic Constants of Uranium. Henry L. Laquer, William E. McGee and Myra F. Kilpatrick.

Transactions of American Society for Metals, v. 42, 1950, p. 771-784.

Previously abstracted from *U. S. Atomic Energy Commission,* AECD-2606. See item 42-Q, 1950. (Q21, U)

305-Q. Stability of AISI Alloy Steels at Elevated Temperatures. A. B. Wilder and J. O. Light. *Transactions of American Society for Metals,* v. 42, 1950, p. 917-934; discussion, p. 934.

Previously abstracted from Preprint. See item 3B-200, 1949. (Q6, N8, AY)

306-Q. Creep and Rupture of Several Chromium-Nickel Austenitic Stainless Steels. G. V. Smith, E. J. Dulis, and E. G. Houston. *Transactions of American Society for Metals,* v. 42, 1950, p. 935-978; discussion, p. 978-980.

Previously abstracted from Preprint. See item 3B-202, 1949. (Q3, Q4, M27, SS)

307-Q. The Effect of Sigma Phase on the Short-Time High Temperature Properties of 25 Chromium-20 Nickel Stainless Steel. Glen J. Guarnieri, James Miller, and Frank J. Vawter. *Transactions of American Society of Metals,* v. 42, 1950, p. 981-1000; discussion, p. 1000-1007.

Previously abstracted from Preprint. See item 3B-203, 1949. (Q3, Q27, N8, SS)

308-Q. Influence of Composition on Temper Brittleness in Alloy Steels. A. P. Taber, J. F. Thorlin, and J. F. Wallace. *Transactions of American Society for Metals,* v. 42, 1950, p. 1033-1055; discussion, p. 1055-1056.

Previously abstracted from Preprint. See item 3B-201, 1949. (Q23, J26, AY)

309-Q. Influence of Strain Rate and Temperature on the Creep of Cold Drawn Ingot Iron. William D. Jenkins and Thomas G. Digges. *Transactions of American Society for Metals,* v. 42, 1950, p. 1128-1129; discussion, p. 1129-1130.

Previously abstracted from *Journal of Research of the National Bureau of Standards.* See item 3B-220, 1949. (Q3, Fe)

310-Q. An Evaluation of a Theory for Plastic Flow in Anisotropic Sheet Metals. T. H. Hazlett, A. T. Robinson, and J. E. Dorn. *Transactions of American Society for Metals,* v. 42, 1950, p. 1326-1356.

The theory assumes that strain increments are linear functions of stresses, that work hardening is a function of plastic strain energy, and that kind and degree of anisotropy does not change materially over the ranges of deformations considered. Merits and deficiencies considered by comparing actual stress-strain relationships of Al, Mg, and sheet steel in tension as a function of orientation with those predicted by theory. 17 ref. (Q24, Al, Mg, ST)

311-Q. Improved Test Bars for Standard and Ductile Grades of Cast Iron. Richard A. Flinn and R. Wayne Kraft. *American Foundrymen's Society,* Preprint No. 50-1, 1950, 15 pages.

A series of Y-shaped test blocks was designed to provide sound test bars in a wider range of section sizes (¼-3 in). Comparative tests were made with arbitration bars. (Q27, CI)

312-Q. Some Tests on Relaxation of Cast Iron. V. T. Malcolm and S. Low. *American Foundrymen's Society,* Preprint No. 50-9, 1950, 3 pages.

The tests are convenient for determining the efficacy of stress relief. (Q25,CI)

313-Q. Composition and Properties of Gray Iron. Part I. Richard Schneidewind and R. G. McElwee. *American Foundrymen's Society,* Preprint No. 50-38, 1950, 19 pages.

Re-evaluates Maurer diagram and reduces some of the relationships to a quantitative and readily usable basis. Mathematical expression and graphs to show limiting compositions of C and Si which will cast white. Correlates composition (as measured by carbon equivalent), tensile strength, and section size for sand casting. Equation for predicting tensile strength and its relationship to other mechanical properties. 49 ref. (Q23, E11, CI)

314-Q. Steel Quality as Related to Test Bar Fractures. H. H. Johnson and G. A. Fisher. *American Foundrymen's Society,* Preprint No. 50-41, 1950, 12 pages.

Importance of character of test-bar fractures as an indication of steel quality. Statistical methods were used to demonstrate differences in quality levels. Two general causes of non-cupped fractures were studied (effect of gases and inclusions). Mechanical properties. (Q26, CI)

315-Q. Dilatometer Studies of Nodular Cast Iron. N. A. Ziegler, W. L. Meinhart, and J. R. Goldsmith. *American Foundrymen's Society,* Preprint No. 50-62, 1950, 12 pages.

Studies of thermal and mechanical properties of samples taken from a casting composed of progressively thicker cross-sections. 63 ref. (Q23, P11, CI)

316-Q. Correlation of Plastic Deformation During Metal Cutting With

Tensile Properties of the Work Material. J. T. Lapsley, Jr., R. C. Grassi, and E. G. Thomsen. *American Society of Mechanical Engineers,* Paper No. 49-A-121, Dec. 1949, 14 pages.

Orthogonal cutting of seamless steel tubing (composition not given) was employed for feeds of 0.0025-0.0085 in. per rev. and positive rake angles of 25-45°. Deformation and forces of cutting were obtained. Results indicate that tensile properties of the work material may offer a useful index to metal cutting performance. (Q23, G17, ST)

317-Q. Influence of Very Low Temperatures on the Hardness of Carbon Steels. Jozef Mazur. *Nature,* v. 165, Apr. 15, 1950, p. 610-611.

Six steels containing 0.10, 0.25, 0.45, 0.75, 0.90, and 1.25% C, respectively, were quenched in brine after holding for 30 min. in a CO atmosphere at 780-960° C. The specimens were then immersed in liquid He for about 3 hr. at 1.5-2.0° K. Hardnesses were determined before heat treatment, after quenching, and after cold treatment. Results show a large decrease in hardness due to cold treatment..
(Q29, J26, CN)

318-Q. Surface Effects in the Creep of Cadmium Single Crystals. E. O. Hall. *Nature,* v. 165, Apr. 15, 1950, p. 611-612.

When oxide-coated, single-crystal Cd wires are immersed in an electrolyte such as $CdCl_2$, creep rate is increased many times. However, this rate later decreases, and may stop altogether, due to formation of a crystalline dendrite coating. Electron-microscope investigation showed this material to be $Cd(OH)_2$. Mechanism of the creep effect is proposed. (Q3, R2, Cd)

319-Q. Mechanical Properties of Low-Carbon Molybdenum-Boron Steels. *Alloy Metals Review,* v. 8, Mar. 1950, p. 2-11. Condensed from article of similar title by W. E. Bardgett and L. Reeve.

Previously abstracted from Journal of the Iron and Steel Institute. See item 3B-262, 1949. (Q23, AY)

320-Q. Atomic Displacements Associated With Elasticity in Plastically Deformed Metals. W. A. Wood. *Journal of the Institute of Metals,* v. 77, Mar. 1950, p. 65-78.

Determination by X-ray diffraction of the magnitude of the internal stresses developed between the grains during plastic deformation of tensile specimens of Fe and Al. In fine-grained specimens, magnitude of the stresses tends to increase in a regular manner with deformation up to a maximum comparable with ultimate stress of the material. However, as grain-size becomes coarser and of the same order of size as the section of the test-piece, intergranular stresses become irregular both in magnitude and direction, and also tend to be smaller. Proposes mechanism other than that which attributes the stresses to mechanical anisotropy of the grains. (Q23, Fe, Al)

321-Q. A Free Cone Bend Test for Aluminium Alloy Sheets and Coils. W. Thompson. *Metallurgia,* v. 41, Apr. 1950, p. 341-345.

Specifications for thin-gage, light-alloy sheets usually call for a bend test instead of an elongation determination as evidence of adequate ductility. Describes a single test for accurate determination of maximum bend radius. (Q5, Al)

322-Q. From a Metallurgist's Notebook: Laundry Springs. H. H. Symonds. *Metal Industry,* v. 76, Apr. 21. 1950, p. 306.

The permanent set encountered in Cu-base laundry-press springs operating in a moisture-laden atmosphere at 200-300° F. was investigated. Compositional and design factors. (Q28, T7, Cu)

323-Q. Influence of Rate of Loading of the Test Machine on Tensile Strength of Cast Iron. Application of Statistical Methods for Interpretation of the Results. (In French.) Jean Gélain. *Fonderie,* Feb. 1950, p. 1933-1939; discussion, p. 1939-1940.

Investigated for 318 specimens of cast iron containing 3.32% C, 1.88% Si, and 0.73% Mn, using three rates of loading. Statistical method used for analysis of the data. (Q27, CI)

324-Q. The Role of Nickel in Cast Copper Alloys. (In French.) J. S. Vanick. *Fonderie,* Feb. 1950, p. 1941-1953; discussion, p. 1953.

Influence of Ni on mechanical properties, resistance to wear, and hardness of various cast Cu alloys. (Q general, Cu)

325-Q. Influence of the Form of Graphite on Internal Friction in Cast Irons. (In French.) Albert Portevin, Robert Cabarat, and Léon Guillet. *Comptes Rendus* (France), v. 230, Mar. 6, 1950, p. 891-892.

Investigated for four different cast irons, using the apparatus developed by Cabarat. The form of the graphite is the principal factor, while the nature of the matrix (ferritic, pearlitic, or mixed) has little effect on internal friction.
(Q22, CI)

326-Q. Mechanism Responsible for the Plateau Observed in the Curves of Tensile Strength of Annealed Steels. (In French.) Christian Boulanger. *Comptes Rendus* (France), v. 230, Mar. 13, 1950, p. 1072-1074.

Above phenomenon is discussed in the light of the theory of dislocations. The case of annealed steels is correlated with the general case of cold worked and aged steels which involves a mechanical effect determined by the change in specific volume accompanying the γ-α transformation followed by aging during cooling. (Q23, N7, ST)

327-Q. Electromagnetic Predetermination of Probable Fatigue Limit. (In French.) André Langevin, Emmanuel Paul, and Marcel Reimbert. *Comptes Rendus* (France), v. 230, Mar. 20, 1950, p. 1138-1140.

Method for steel based on determination of variation of magnetic permeability as a function of applied tensile stress. Data are charted. (Q7, ST)

328-Q. Effect of Free Surface on Resistance to Deformation of Multicrystalline Materials. (In German.) F. Vitovec and A. Slibar. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 16, Mar. 1950, p. 76-80.

Theoretical discussion of forces that oppose deformation of multicrystalline materials. 24 ref. (Q24)

329-Q. Concerning the Effective Range of Strain Hardening. (In German.) A. Slibar and F. Vitovec. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 16, Mar. 1950, p. 80-84.

Theoretical mathematical analysis of the extent to which crystalline layers surrounding a given grain obstruct slip of this grain. Effects of orientation and distance from the grain of the layers. 20 ref. (Q24)

330-Q. Magnitude of the "Transverse Number" in Plastic Deformation. (In German.) F. Vitovec. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 16, Mar. 1950, p. 85-87.

"Transverse number" (reciprocal of Poisson's ratio) was calculated over the range of plastic deformation on the assumption of no change in volume of the material. Under uniaxial tension, this number increases; and under uniaxial compression, decreases. In either case, transverse number approaches the value 2.0 with decrease in degree of deformation. 10 ref. (Q24)

331-Q. Automatic Load Control for Automatic Testing Machines for Structural Parts. (In German.) August Becker. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, Apr. 11, 1950, p. 266-271.

Principles, design, and operation. 21 ref. (Q27)

332-Q. Concerning the Frictional Properties of Metals and Alloys. V and VI. (In Japanese.) Koichi Mizuno. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Sept. 1949, p. 13-19.

In Part V, relationships between smoothness of surface and frictional properties were studied for various metals and alloys, including the so-called bearing metals. In Part VI, results of wear tests on carbon steels and cast irons show that wear is proportional to hardness variation of the bearing surfaces. Surface hardness decreases with increasing carbon content. Compares this phenomenon with oxide-film hardness reported in Part II. Proposes a quenching mechanism for the large increase of the hardness of the bearing surfaces of carbon steel under certain conditions. (Q9, SG-c, CI)

333-Q. Some Experiments on the Wear of Metals for the Sewing Machine. (In Japanese.) Syuzi Ando and Tadashi Numazu. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Sept. 1949, p. 19-23.

Influence of composition, microstructure, case hardening, and surface roughness of ferrous and nonferrous sewing-machine parts subject to frictional contact was investigated. Results are summarized in English. (Q9, T10, SG-m)

334-Q. Variation of Young's Modulus of Binary Body-Centered Alloys Caused by the Formation of Superlattices. (In Japanese.) Yoshio Shibuya. *Nippon Kinzoku Gakkai-si* (Journal of the Japan Institute of Metals), v. 13, Oct. 1949, p. 1-6.

Theoretical analysis for the case of CuZn (β-brass), based on the Bragg-Williams approximation. Results thus obtained are compared with experimental ones of Rinehart and of Köster. Fair agreement was found. 20 ref. (Q21, N10)

335-Q. Research on Forging Dies. II. Mechanical Properties at High Temperatures. (In Japanese.) *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Oct. 1949, p. 25-27.

Investigation of effects of heat, impact, and abrasion on a series of regular and war-emergency die steels used in Japan. (Q general, T5, AY)

336-Q. The Mechanism of Failure of Case Hardened Steel. I. Relationship of Case Depth and Tensile Properties. II. Relationship of Notch Radius and Tensile Strength. III. Discussion of the Theory of the Mechanism of Failure of Case Hardened Steel. (A New Method for Measuring Technical Cohesive Strength.) (In Japanese.) Hisao Matsumoto. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Oct. 1949, p. 27-32.

Woodvine's fatigue theory is extended to cover the tensile properties of case hardened steel by introducing the concept of technical cohesive strength. Carbon and chromium steels were investigated. Three stages of tensile properties based on case depths were distinguished. Shows that residual stress is due to residual tensile stress in the inner layer and residual compression stress in the case hardened layer. Attempts to extend Woodvine's theory to testpieces with different notch radii. 31 ref. (Q27, J28, CN, AY)

337-Q. Resistance to Wear of Heavily Loaded Gears. (In Russian.) D. S. Kazarnovskii and I. S. Svet. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Jan. 1950, p. 20-23.

Causes of breakdown of the smaller gears in tractor transmissions were investigated. Methods of increasing service life of such gears. (Q9, T7, CN)

338-Q. Structural Properties of Modified Cast Irons (Unalloyed, Containing Flaky Graphite.) (In Russian.) *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Jan. 1950, p. 34-35.

Table shows physical and mechanical constants of various cast irons under static, impact, and dynamic loading. (Q general, CI)

339-Q. Dependence of Tensile Strength on Duration of Applied Stress for Brittle Fracture. (In Russian.) G. M. Bartenev. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Mar. 1, 1950, p. 23-26.

On the basis of theoretical considerations and interpretation of formulas proposed by Griffith, the author concludes that "static" fatigue may be explained purely mechanically. Brittle fracture is characterized by two constants: maximum technical tensile strength and "static" fatigue. (Q23, Q7)

340-Q. Vibration of Marine-Turbine Blading. R. W. Nolan. *Transactions of the American Society of Mechanical Engineers,* v. 72, May 1950, p. 439-446.

General explanation of vibration phenomena encountered in turbine design. An apparatus for determining natural frequency of blading, and another for applying both tensile and alternating bending stresses simultaneously. Direct tensile stress is plotted vs. alternating bending stress which causes failure, thus obtaining a curve which shows the resistance to any combination of these stresses. Design stresses for certain turbine blades and the stresses involved in several blade failures are plotted. Magnification factors for two stainless steels at room temperature, and one of them at 750° F., are plotted vs. vibratory bending stress. (Q5, Q27, T25)

341-Q. Stress Distribution Around Spot Welds. A. O. Bergholm, P. W. Swartz, and G. S. Hoell. *Welding Journal,* v. 29, May 1950, p. 217s-223s.

Stresses around spot welds in flat bars of low-carbon steel with two and three weld spots were studied, using special techniques. Results of photo-elastic and Stresscoat enamel studies indicated proper placement of electrical strain gages. (Q25, K3, CN)

342-Q. Test of H-Section Welded Truss. A. T. Waidelich. *Welding Journal,* v. 29, May 1950, p. 252s-258s.

Strain-gage analysis of an 80-ft. truss. Measured stresses and deflections were found to be in close agreement with theoretical values. (Q25, K general, CN)

343-Q. A Review of Information on the Mechanical Properties of Aluminum Alloys at Low Temperatures. K. O. Bogardus, G. W. Stickley, and F. M. Howell. *National Advisory Committee for Aeronautics,* Technical Note 2082, May 1950, 65 pages.

Sources of data (room temperature to temperature of boiling hydrogen) and material to be found in each. General conclusions on alloys used commercially in this country are given. (Q general, Al)

344-Q. Improvement of High-Temperature Properties of Magnesium-Cerium Forging Alloys. K. Grube, J. A. Davis, L. W. Eastwood, C. H. Lorig, and H. C. Cross. *National Advisory Committee for Aeronautics,* Technical Note 2097, May 1950, 42 pages.

Experimental heats were made by addition of a fourth element to the base composition containing 6% Ce and 2% Mn. Tensile properties at 70° and 600° F. were obtained and most compositions were subjected

to short time creep tests at 600° F. (Q3, Q4, Mg, SG-h)

345-Q. Meyer Analysis of Metals. D. Hatch and E. J. W. Whittaker. *Nature,* v. 165, Apr. 22, 1950, p. 646-647.

In a recent communication under the above title (v. 164, p. 1129, 1949; see item 90-Q, 1950) Finniston, Jones, and Madsen utilized the two basic equations: $L = ad^n$ and $aD^{n-2} = \text{constant}$, due respectively to Meyer and O'Neill. Outlines some results which show that the second equation may be applicable in some circumstances, but is not generally true. It was found that when a steel ball was pressed into a Pb or In surface, the latter equation fails. (Q29)

346-Q. Notched and Unnotched Fatigue Tests on Flake and Nodular Cast Irons. J. W. Grant. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Apr. 1950, p. 333-354.

Results for 20 cast irons, including 9 pearlitic and acicular flake graphite irons, 7 Ce-treated nodular irons, and 2 as-cast and annealed Mg-treated nodular irons. Results are compared with other published data. (Q7, CI)

347-Q. Engineering Steels Under Combined Cyclic and Static Stresses. H. J. Gough. *Institution of Mechanical Engineers, Proceedings,* v. 160, no. 4, 1949, p. 417-440.

Previously abstracted from *Engineer.* See item 3B-270, 1949. (Q1, Q5, Q7, ST)

348-Q. The Influence of Stripping Temperature on the Properties of Pearlitic Grey Cast Iron. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. A61-A73; discussion, p. A73-A77.

Influence on mechanical properties, machinability, microstructure, and distortion. Results indicate that changes in characteristics over a wide range of stripping temperatures are not very marked. Effects on distortion are more complex and need to be determined for each particular casting. Data are tabulated and plotted. (Q general, E24, G17, M27, CI)

349-Q. Mechanical Properties of Some Copper-Base Alloy Castings. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. A134-A153; discussion, p. A153-A157.

Brief general discussion, and specific information on sand-cast and chill-cast phosphor bronze, leaded and lead-free gunmetals, Al bronze, and high-tensile brasses. (Q general, Cu)

350-Q. (Book) **The Strength of Wrought Steels at Elevated Temperatures.** R. F. Miller and J. J. Heger. 116 pages. 1950. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $2.25 to members; others $3.00.

Extensive tabular and graphical data cover tensile, creep and rupture properties of standard grades of both carbon and alloy steels. Includes considerable tabular material with rather complete references, also extensive curves and charts. (Q23, Q3, Q4, CN, AY, SG-h)

351-Q. (Book) **Stress and Strength of Manufactured Parts.** Charles Lipson, G. C. Noll, and L. S. Clock. 259 pages. 1950. McGraw-Hill Book Co., 330 W. 42nd St., New York 8. $4.50.

Part I deals with basic concepts and of balance between stress and strength. Part II consists of data charts. Specific data pertain only to steel members, but general principles are applicable to other materials. 270 ref. (Q23, ST)

352-Q. Mechanical Testing, Experimental Stress Analysis and Apparatus in Pressure Vessel Research. F. G. Tatnall. *American Society of Mechanical Engineers,* Paper No. 49-A-68, 1949, 11 pages.

Reviews the above for interpretation of test data leading to design improvement and safety in structures. (Q25)

353-Q. Strong Ductile Alloy Steel Permits Weight Saving in Structural Parts. D. A. Shinn. *Materials & Methods,* v. 31, May 1950, p. 70-72.

Impact properties at high strength levels of Hy-Tuf, a relatively new Ni-Cr-Mo steel, which compare favorably with those of SAE 4340. Suggests its use for such critical applications as aircraft structures. (Q6, T24, AY)

354-Q. Properties of Metals at Elevated Temperatures. G. V. Smith. *Combustion,* v. 21, Apr. 1950, p. 65-67; May 1950, p. 51-53.

Part I: Metal strength at elevated temperatures, working stresses that may be applied, characteristics of creep, and the relation between stress and time for rupture. A typical design chart for a stainless steel. Part II: Effects of non-constant stress and temperature, metallurgical variables, microstructural and surface changes, and scaling and corrosion. (Q3, Q4, M27, R2, SG-h)

355-Q. Plastic Collapse and Shakedown Theorems for Structures of Strain-Hardening Material. B. G. Neal.

Journal of the Aeronautical Sciences, v. 17, May 1950, p. 297-306.

Some theorems concerning collapse and shakedown are established for trusses and framed structures whose members possess strain-hardening properties. The most interesting cases, covered by the theorems, are those in which strain hardening is limited, so that the stress-strain characteristic eventually becomes horizontal and plastic deformation can continue indefinitely under constant stress. 19 ref. (Q28)

356-Q. Anomalous Internal Friction Associated With the Precipitation of Copper in Cold-Worked Al-Cu Alloys. T'ing-Sui Ke. *Physical Review,* ser. 2, v. 78, May 15, 1950, p. 420-423.

Anomalous internal friction at very small stress levels was observed in cold-worked aluminum containing 0.5% Cu. This friction, which was not observed in high-purity Al after similar treatment, can be eliminated by annealing at high temperatures so that the specimen completely recrystallizes. This anomalous behavior is shown to be associated with an early stage "precipitation" of Cu from the solid solution with Al. Observed phenomena are consistent with the concept that atmospheres of foreign atoms are formed around the dislocations created in the specimen by cold working. 14 ref. (Q22, N5, Al)

357-Q. A New Criterion for the Occurrence of Slip in Thin Single Crystals. T. L. Wu and R. Smoluchowski. *Physical Review,* ser. 2, v. 78, May 15, 1950, p. 468-469.

It was found that in thin crystals of Al, slip does not occur in the plane or direction which corresponds to the maximum resolved shear. Instead, slip directions are favored which correspond to a short path of slip across the crystal. A formula is derived which permits one to predict the behavior of thin single crystals in tension. (Q25, Al)

358-Q. Influence of Interfacial Potential on Friction and Surface Damage. F. P. Bowden and L. Young. *Research,* v. 3, May 1950, p. 235-237.

Experimental study applied to inert metals, such as Pt, immersed in an electrolyte, shows that small changes in interfacial potential have a profound effect, both on friction and on the surface deformation. Results are explained in terms of the electrodeposition and electrosolution of absorbed gas layers, and also of electrical interaction of the charged double layer. 12 ref. (Q9, P15, EG-d)

359-Q. Fatigue Properties of Four Cast Aluminum Alloys at Elevated Temperatures. J. McKeown, D. E. Dineen, and L. H. Back. *Metallurgia,* v. 41, May 1950, p. 393-396. (Q7, Al)

360-Q. Measurement of Stresses in Bicycle Frames Under Normal Operating Conditions. (In French.) Francois Flusin. *Revue de l'Aluminium,* v. 27, Mar. 1950, p. 89-95.

Stresses at certain points of an Al alloy bicycle frame were measured under a static load of 198 lb. Maximum fatigue was recorded in the fork. Dynamic measurements made either on the testing stand or on the road show that corresponding overloads can be in the neighborhood of 100% of the static values. Concludes that a greater reduction of weight is still possible. (Q25, Al)

361-Q. Contribution to the Study of Influence of Microstructure on the Heat Resistance of Steel. (In French.) Georges Delbart and Michel Ravery. *Revue de Metallurgie,* v. 47, Mar. 1950, p. 215-233; discussion, p. 233-234.

Investigated for a low-alloy Cr-Mo steel produced in a basic electric furnace. Creep properties were determined at 450, 525, 550, and 575° C. under loads of 7, 11, 15, and 24 kg. per sq. mm. in shortened long-time tests. Influence of heat treatment on creep properties. Microstructures corresponding to the various treatments are illustrated. 14 ref. (Q3, M27, AY)

362-Q. Embrittlement of High-Phosphorus Steels Upon Annealing. (In German). Eduard Houdremont and Hans Schrader. *Archiv für das Eisenhüttenwesen,* v. 21, Mar.-Apr. 1950, p. 97-104.

Previously abstracted from Swedish version in *Jernkontorets Annaler.* See item 115-Q, 1950. (Q23, J23, ST)

363-Q. Creep of Steel Under Static Stresses at Room Temperature. (In German.) Walter Jäniche and Gunther Thiel. *Archiv für das Eisenhüttenwesen,* v. 21, Mar.-Apr. 1950, p. 105-118.

Creep behavior of six carbon and low-alloy steels at room temperature and effects of heat-treatment and cold working when stressed below the yield point up to several hundred hours were studied. 34 ref. (Q3, CN, AY)

364-Q. Elongation and Stress Measurements on Thin Resistance Wires (Extensometer Strips). (In German.) Kurt Fink. *Archiv für das Eisenhüttenwesen,* v. 21, Mar.-Apr. 1950, p. 129-135.

Experiments which show the extent to which tensile stress alters the electrical resistance of wires made of "Chrome-Nickel B" (18% Cr, 60% Ni, 18.5% Fe, 3% Mn, and 0.5% Si), "CN" (20% Cr, 79% Ni), and Constantan (55% Cu, 43.5% Ni, 1.5% Mn). Measurements made for elongations of less than 0.5 up to 5% show that resistance change is a linear function of elongation. The measurements were extended to tensile, compression, bending and torsional stresses. 11 ref. (Q23, P15, Ni, Cu)

365-Q. A Dynamic Calibration of Extensometer Strips. (In German.) *Archiv für das Eisenhüttenwesen,* v. 21, Mar.-Apr. 1950, p. 137-142.

Using an extensometer strip, a tube amplifier, and a cathode-ray oscillograph, impulse waves produced by one steel bar dropping on another were recorded photographically. Close agreement between the measured and the calculated impulse wave shows that extensometer strips can be used to record dynamic stresses. 14 ref. (Q25)

366-Q. Relaxation at High Temperatures. (In Czech.) Alexander A. Chit'kov. *Hutnické Listy,* v. 5, Feb. 1950, p. 52-56.

Two theories have been proposed for correlation of relaxation and creep data (the time-hardening and the strain-hardening theories). Experimental data show that neither theory correctly represents the above relationship because relaxation differs from creep in connection with both the mechanism of plastic deformation and the nature of internal "micro-mechanical" processes. Indicates that stress relaxation must be investigated independently of creep. 17 ref. (Q3)

367-Q. Microhardness of Carbon Steels. (In Polish.) W. Loskiewicz, W. Haczewski, and Z. Wojcik. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 2, no. 1, 1950, p. 37-47.

The relation between results of hardness measurements obtained by use of micro and macro methods was investigated. Six carbon steels of various compositions were quenched and tested at different stages of isothermal transformation of austenite. The tests confirmed the fact that in the transition range from bainite to pearlite local decrease of microhardness occurs. 18 ref. (Q29, N8, CN)

368-Q. Internal Friction of Metals at Very High Temperatures. T'ing-Sui Ke. *Journal of Applied Physics,* v. 21, May 1950, p. 414-419.

In connection with study of internal friction peak (vs. temperature) associated with viscous behavior of grain boundaries in metals, some other effects were observed at higher temperatures causing additional internal friction in superposition with the high-temperature branch of this internal friction peak. This additional internal friction was found to have its origins in some effects of cold working introduced into the interior of the grains which remains even after complete recrystallization. This friction was found to be very high in aged specimen of high-purity Al. Observations are consistent with the viewpoint that this internal friction is caused by the presence of dislocations in the interior of the specimen. 14 ref. (Q22)

369-Q. Fatigue Characteristics of Aircraft Materials and Fastenings. T. E. Piper, K. F. Finlay, and A. P. Binsacca. *ASTM Bulletin,* May 1950, p. 60-64; discussion, p. 64.

Abstracts from numerous papers on the subject, in addition to the authors' experience indicate that methods of evaluation of fatigue characteristics of aircraft materials and fastenings must undergo drastic revision. Conventional testing procedures do not supply data significant to sever conditions of dynamic loading found in aircraft of modern design. Recommends establishment of significant criteria upon which realistic design can be based on extensive tests involving interrupted dynamic test procedures. Data presented are for spot welded and riveted Alclad and Al alloy sheets. 12 ref. (Q7, Al)

370-Q. The Why and How of Cold Hardness Measurement. John H. Hruska. *Iron Age,* v. 165, June 1, 1950, p. 77-80.

Special auxiliary equipment for use with standard testing machines, for determining hardness at below-zero temperatures. Data for various steels, and for commercial and very pure metals are tabulated. (Q29)

371-Q. Relative Wear Rates of Various Diameter Grinding Balls in Production Mills. D. E. Norquist and J. E. Moeller. *Mining Engineering,* v. 187, June 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, 1950, p. 712-714; discussion, p. 714.

Results of wear on marked balls, 4, 3½, 3, and 2 in. diam. All balls were forged alloy steel of practically the same chemical analysis and hardness. Results indicate that

balls in a given mill for a given length of time will have equal diameter losses, regardless of size. (Q9, B13, AY)

372-Q. A High-Temperature Extensometer. W. W. Eitel and J. H. Potter. *Instruments,* v. 23, May 1950, p. 448-449.

Instrument designed for measuring bolt stresses in high-pressure, high-temperature flanged pipe joints at the time of assembly and under operating conditions. (Q27)

373-Q. Comparing Fundamentals of Spring Suspensions. *Vancoram Review,* v. 6, no. 3, 1950, p. 3-5, 20-21. Based on paper by N. E. Hendrickson.

Efficiency of various types of springs was studied by comparing the "energy storage" each could provide. The fundamental principles are applicable to all springs, whether made of steel or nonferrous metals. Formulas for calculating the theoretical weight of spring steel required in each type for a given load, deflection, and stress. (Q28, T7, ST)

374-Q. Mechanical Testing and Properties of Gray Iron. C. K. Donoho. *Foundry,* v. 78, June 1950, p. 96-99, 218-219.

Common mechanical tests for cast iron, including nodular iron. Some new test data on section size effect. (Q general, CI)

375-Q. Structural Properties of Magnesium. *Magazine of Magnesium,* May 1950, p. 8-11.

Comparative data on various mechanical and physical properties are tabulated and discussed. (Q general, P general, Mg)

376-Q. Stresses in "Head-to-Shell" Juncture of Pressure Vessels. R. G. Sturm, H. L. O'Brien, E. Wetterstrom, and J. Evans. *Welding Journal,* v. 29, June 1950, p. 285s-292s.

Resume of literature theories in the design of pressure vessel head, application of these theories, tests of stress distribution under pressure, and correlation of test results with theory. (Q25, T26, CN)

377-Q. Weld Metal Properties at Low Temperatures. T. N. Armstrong and W. L. Warner. *Welding Journal,* v. 29, June 1950, p. 295s-302s.

Tests of deposited metal of ferritic nickel steel electrodes containing up to 5% nickel, 25-20 stainless steel, monel, and a high Ni-Cr-Fe alloy containing Cb. Mechanical properties are tabulated, plotted, and discussed. (Q general, K general, AY, ST, Ni)

378-Q. Brittle Failure and Size Effect in a Mild Steel. K. J. Stodden and E. P. Klier. *Welding Journal,* v. 29, June 1950, p. 303s-310s.

Under certain experimental conditions the phenomenon of size effect can be sensibly eliminated as it pertains to the appearance of brittle failure. Specimen sizes ranged from the 10x10-mm. Charpy bar to a 1¼x1¼-in. bar tested in slow bending. For these sizes the transition temperature was invariant. 18 ref. (Q6, CN)

379-Q. What Roller Bearings Mean to Diesel-Electric Locomotives. F. S. Ball. *Railway Age,* v. 128, June 10, 1950, p. 68-70.

Control of fatigue effect, theory of metal failure, and bearing design. (Q7, S21, T7, T23)

380-Q. Stress-Strain and Elongation Graphs for Alclad Aluminum Alloy 24S-T86 Sheet. James A. Miller. *National Advisory Committee for Aeronautics,* Technical Note 2094, May 1950, 31 pages.

Results of tests on duplicate longitudinal and transverse specimens with nominal thicknesses of 0.032, 0.064, and 0.125 in. are plotted. Tensile and compressive stress-strain and stress-deviation to a strain of about 1% are presented on dimensionless graphs. Stress-strain graphs and graphs of local elongation and of elongation against gage length are included for tensile specimens tested to fracture. 11 ref. (Q27, Al)

381-Q. Fracture and Strength of Solids. E. Orowan. *Reports on Progress in Physics,* v. 12, 1949, p. 185-232.

The main types of fracture and the corresponding fracture mechanism. Ultimate stress and necking, brittle fracture, ductile fractures and notch brittleness, fatigue, intercrystalline fractures, fracture by molecular sliding, etc. 94 ref. (Q26)

382-Q. Report of Committee A-3 on Cast Iron. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 97-109.

Includes report of Subcommittee XV on impact testing and proposed methods for impact testing of cast iron. (Q6, CI)

383-Q. Report of Joint Committee on Effect of Temperature on the Properties of Metals. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 241-255.

Includes brief appendices as follows: "Effect of Variables on the Creep Resistance of Steels" (H. C. Cross); "Stability of Steels as Affected by Temperature" (J. J. Kan-

ter); and "High-Temperature and Low-Temperature Testing Equipment in the United States" (results of a questionnaire). (Q3)

384-Q. Residual Stresses in Metals. William Marsh Baldwin, Jr. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 539-583.

23rd Edgar Marburg Lecture. Comprehensive description of the present state of knowledge concerning residual stresses, showing the progress made since E. Heyn's lecture before the British Institute of Metals in 1914. 64 ref. (Q25)

385-Q. Effect of Manufacturing Practice on Creep and Creep-Rupture Strength of Low-Carbon Steel. G. V. Smith and E. J. Dulis. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 584-599; discussion, p. 600-601.

Previously abstracted from *American Society for Testing Materials,* Preprint No. 18. See item 3B-119, 1949. (Q3, CN)

386-Q. The Effects of Temperature and Material Structure on the Fracture Properties of Medium-Carbon Steel. Julius Miklowitz. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 602-617.

Effects of variations in temperature of testing, size of grain, and type of pearlite in the structures of a Si-killed and Si-Al-killed steel on ductility and strength were determined. Apparatus and test results. Micrographs show structures resulting from various thermal treatments. (Q26, M27, CN)

387-Q. The Influence of Conditions of Heat Treatment and Hot-Cold Work on the Properties of Low-Carbon N-155 Alloy at Room Temperature and 1200° F. J. W. Freeman, E. E. Reynolds, D. N. Frey, and A. E. White. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 618-645.

Previously abstracted from *American Society for Testing Materials,* Preprint No. 21. See item 3B-130, 1949. (Q general, Co, SG-h)

388-Q. The Influence of Fluctuations in Stress Amplitude on the Fatigue of Metals. T. J. Dolan, F. E. Richart, Jr. and C. E. Work. *American Society for Testing Materials Proceedings,* v. 49, 1949, p. 646-679; discussion, p. 680-682.

Previously abstracted from *American Society for Testing Materials,* Preprint No. 32. See item 3A-137, 1949. (Q7, ST, Al)

389-Q. The Effects of Metallizing Procedures on the Fatigue Properties of Steel. W. Lee Williams. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 683-700; discussion, p. 701.

Previously abstracted from *American Society for Testing Materials,* Preprint No. 20. See item 7B-107, 1949. (Q7, L10, G23, ST)

390-Q. A New High-Speed Sheet Metal Fatigue Testing Machine for Unsymmetrical Bending Studies. G. R. Gohn and E. R. Morton. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 702-713; discussion, p. 714-716.

Previously abstracted from *American Society for Testing Materials,* Preprint No. 31. See item 9-166, 1949. (Q7)

391-Q. The Time Delay for the Initiation of Plastic Deformation at Rapidly Applied Constant Stress. D. S. Clark and D. S. Wood. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 717-735; discussion, p. 736-737.

Previously abstracted from *American Society for Testing Materials,* Preprint No. 25. See item 9-177, 1949. (Q27, CN)

392-Q. Elastic and Fracture Toughness Studies of a Stainless Steel. Carl W. Muhlenbruch. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 738-753; discussion, p. 754-756.

Previously abstracted from *American Society for Testing Materials,* Preprint No. 24. See item 3B-144, 1949. (Q21, Q26, SS)

393-Q. Dynamic Creep and Rupture Properties of Temperature Resistant Materials Under Tensile Fatigue Stress. B. J. Lazan. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 757-787; discussion, p. 799-803.

Limitations of static testing and importance of dynamic creep and rupture properties in designing for high-temperature service. Newly developed testing equipment for determining creep and rupture properties. Data on several temperature resistant materials show the influence of dynamic stress on creep and time to rupture. Relationships between testing temperature and dynamic stress influence on creep and rupture. Includes photomicrographs of N-155, S-816, 19-9 DL, and Vitallium. 11 ref. (Q3, Q4, SG-h)

394-Q. Effect of Pulsating Loads on the Creep Characteristics of Aluminum Alloy 14S-T. M. J. Manjoine. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 788-798; discussion, p. 799-803.

Previously abstracted from *American Society for Testing Materials,* Preprint No. 27. See item 9-190, 1949. (Q3, Al)

395-Q. Fatigue Characteristics of Aluminum Alloy 75S-T6 Plate in Reversed Bending as Affected by Type of Machine and Specimen. T. T. Oberg and R. J. Rooney. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 804-812; discussion, p. 813-814.

Previously abstracted from *American Society for Testing Materials,* Preprint No. 28. See item 9-191, 1949. (Q7, Al)

396-Q. Creep and Stress-Rupture Investigations on Some Aluminum Alloy Sheet Metals. J. E. Dorn and T. E. Tietz. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 815-831; discussion, p. 832-833.

Previously abstracted from *American Society for Testing Materials,* Preprint No. 26. See item 3D-43, 1949. (Q3, Q4, Al)

397-Q. The Influence of Vibration on the Creep of Lead. J. Neill Greenwood. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 834-850; discussion, p. 851-856.

Previously abstracted from *American Society for Testing Materials,* Preprint No. 29. See item 3C-110, 1949. (Q3, Pb)

398-Q. Internal Microstrain and the Deformation and Failure of Metals. 1. The Possibilities of Using the Correlation Between Internal Microstrain and Magnetic Properties in the Study of Metal Failure. P. Cavanagh, T. Wlodek, B. Chalmers, and U. Martius. *Canadian Mining and Metallurgical Bulletin,* v. 43, May 1950, p. 251-253; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 53, 1950, p. 166-168.

Fundamental principles which allow development of a new method for studying the deformation and failure of metals in terms of "internal microstrains". The latter and magnetic properties are defined and their influence on metals is outlined. A research program in progress will determine whether magnetic measurements of internal microstrains give sufficiently accurate values for predicting performance of metals under service conditions. (Q24)

399-Q. Surface Effects and the Plasticity of Zinc Crystals. S. Harper and A. H. Cottrell. *Proceedings of the Physical Society,* v. 63, sec. B, May 1, 1950, p. 331-338.

Effects of various surface treatments on the plastic properties of Zn crystals. Roscoe's observation of the hardening effect of a surface film of oxide is confirmed. The Rehbinder effect—softening crystals by immersing them in paraffin and oleic acid—can be produced on oxidized specimens but not on others. 12 ref. (Q23, P10, Zn)

400-Q. Yield Points in Zinc Crystals. H. L. Wain and A. H. Cottrell. *Proceedings of the Physical Society,* v. 63, sec. B, May 1, 1950, p. 339-345.

Sharp yield points can be produced in crystals of Zn containing nitrogen. The gas is introduced in a preliminary melting operation, either by bubbling it through the metal or by allowing it to be absorbed from the atmosphere, using a flux to keep the surface clean. Strain-aging treatments are needed to develop the yield point clearly, but once it is developed it returns at the same level after each successive treatment at the same temperature. General conditions for producing yield points in metals of common crystal structures. 21 ref. (Q23, Zn)

401-Q. A Simple Constant Stress Apparatus for Creep Testing. L. M. T. Hopkin. *Proceedings of the Physical Society,* v. 63, sec. B, May 1, 1950, p. 346-349.

Simple device which can maintain stress on a creep specimen constant to within 0.8% during uniform extensions up to 100%. The apparatus is suitable for slow rates of strain. Examples of creep curves obtained for Pb and a Pb-Sn alloy. Good agreement with the Andrade creep equation was observed in both cases. (Q3)

402-Q. The Mechanical Properties of Some Wrought and Cast Aluminium Alloys at Elevated Temperatures. P. L. Thorpe, G. R. Tremain, and R. W. Ridley. *Journal of the Institute of Metals,* v. 77, Apr. 1950, p. 111-140.

Results of tensile, fatigue, and creep tests at various temperatures in the range 20-450° C. on 17 wrought and 7 cast alloys, together with results for a form of thermal-strain test on some of the cast alloys. Materials tested included some experimental alloys developed during the last war by the Royal Aircraft Establishment in Britain. (Q27, Q3, Q7, Al)

403-Q. The Effect of Applied Load in Micro-Indentation Tests. W. Rostoker. *Journal of the Institute of Metals,* v. 77, Apr. 1950, p. 175-184.

Experiments were conducted with a Bergsman microhardness tester to study the variation of apparent

hardness with small applied loads in relation to metallurgical condition. It was found that apparent hardness decreases continuously with decreasing load, and that the rate of decrease is dependent on the capacity of the material for cold work. Thus, the "rule of similarity" which is normally applicable to pyramidal indenters breaks down. 12 ref. (Q29)

404-Q. Relation Between Impact Strength and Micrographic Structure of Two Low-Alloy Steels Having Different Sensitivity to the Temper Brittleness. (In French.) Pierre A. Jacquet. *Comptes Rendus* (France), v. 230, mar. 27, 1950, p. 1284-1286.

Investigated for Ni-Cr and Ni-Cr-Mo low-alloy steels quenched in oil from 850° C., annealed at 650 and 525° C., followed by very slow cooling. Results indicate that the type of fracture depends to a great extent on their respective crystal structures. (Q6, M26, AY)

405-Q. An Attempt To Establish Relationships Between Different Hardness Scales for Gray Cast Iron. (In Polish.) J. Wozniacki. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 1, no. 3, 1949, p. 203-211.

Experimental results based on numerous tests with the Brinell machine and the Alpha microhardness tests, on plates cut from a sand-cast bar having pearlitic structure—in the as-cast condition, as well as cast and annealed. Data were analyzed statistically and relations derived. (Q29, CI)

406-Q. Certain Simplifications of the Theoretical Determination of Deformation and Stresses. (In Russian.) I. P. Baikova. *Avtogennoe Delo* (Welding), Feb. 1950, p. 4-8.

A simplified method of determining residual deformations and stresses caused by the heat of welding or by torch or arc cutting was developed for materials in which structural transformations occur in the temperature range corresponding to the metal's plastic state. Theoretical concepts are graphically interpreted. (Q25, K general)

407-Q. Influence of Welding Stresses and Methods for Their Relief on Strength of Welded Structures. (In Russian.) D. I. Navrotskii. *Avtogennoe Delo* (Welding), Feb. 1950, p. 8-13.

Experimental investigation, mainly in two steels, revealed that welding stresses in material possessing sufficient plasticity do not reduce wear resistance of structural parts under either static or dynamic loading; therefore, relief of welding stresses to increase strength seems to be unnecessary.
(Q25, K general, J1, ST)

408-Q. Vanadium-Treated, Non-Aging, Rimming Steel for Deep Drawing Quality Sheet. S. Epstein, H. J. Cutler, and J. W. Frame. *Journal of Metals,* v. 188, June 1950, p. 830-834.

Production and mechanical properties. (Q general, G4, ST)

409-Q. Factors Affecting Deformation and Rupture of Metals at Elevated Temperatures. Francis B. Foley. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, June 1950, p. 845-850.

At high temperatures metallic systems are considered to be in a disturbed state varying from near stability to great activity, from rigidity to fluidity, from strength to weakness. Cast iron used as an example. (Q4, CI)

410-Q. Slip Markings in Chromium. Earl S. Greiner. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, June 1950, p. 891-892.

Results show that Cr can be deformed plastically at room temperature by compression combined with hydrostatic pressure to reduce the tensile component normal to the slip planes. 10 ref. (Q24, Cr)

411-Q. An Unusual Effect in the Creep of Zinc Single Crystals. L. Slifkin and W. Kautzmann. *Physical Review,* ser. 2, v. 78, June 1, 1950, p. 631-632.

Experimental procedure and results of an investigation. A curious "rest-harding" effect was found.
(Q3, Zn)

412-Q. Why Engine Bearings Fail: 1. Improper Installation; 2. Poor Operation; 3. Faulty Manufacture. *SAE Journal,* v. 58, June 1950, p. 44-47. Based on "Engine Bearings, Construction and Performance", by W. E. Thill.

Fatigue and wear. Materials mentioned are cast iron, steel, and Cu, Sn, and Cd-base alloys.
(Q7, Q9, T7, CI, AY, Cu, Sn, Cd)

413-Q. Polarized Light Shows Nature of Plastic Deformation in Monel Metal. *Journal of the Franklin Institute,* v. 249, June 1950, p. 493-494.

Describes technique.
(Q24, M23, Ni)

414-Q. A New High-Frequency Fatigue Testing Machine. R. Jacquesson and P. Laurent. *Engineers' Digest,* v. 11, May 1950, p. 183. Translated and condensed from *Revue Générale de Mécanique,* v. 34, Jan. 1950, p. 31-33.

Machine is adaptable to varied uses. Amplitude of oscillation as well as length of specimen can be adjusted. Torsion fatigue tests can be taken with a superimposed constant tension. (Q7)

415-Q. Engineering Steels Under Combined Cyclic and Static Stresses. H. J. Gough. *Journal of Applied Mechanics,* v. 17, (*Transactions of the American Society of Mechanical Engineers,* v. 72), June 1950, p. 113-125.

Previously abstracted from *Engineer.* See item 3B-270, 1949. (Q1, Q5, CN)

416-Q. Stress Studies on Piping Expansion Bellows. F. J. Feely, Jr. and W. M. Goryl. *Journal of Applied Mechanics,* v. 17. (*Transactions of the American Society of Mechanical Engineers,* v. 72), June 1950, p. 135-141.

As a result of failures of stainless steel bellows used to take up thermal expansion in the piping of petroleum and chemical processing equipment, a basis was developed for designing them to operate within reasonable stresses. A formula is derived to show the total stress induced in the material as a result of the combined effects of pressure and movement. (Q25, SS)

417-Q. Influence of the Dimensional Factors on Mode of Yielding and Fracture in Medium-Carbon Steel. II. The Size of the Round Tensile Bar. Julius Miklowitz. *Journal of Applied Mechanics,* v. 17 (*Transactions of the American Society of Mechanical Engineers,* v. 72), June 1950, p. 159-168.

Test results show an increase in axial strain, average true stress, and maximum true stress at the minimum section of the neck of a round tension bar at fracture when the size of the bar is decreased. An explanation is given for the effect on axial strain. Metallurgical variations in data are analyzed and discussed. 12 ref. (Q27, CN)

418-Q. Stresses and Deflections of Cylindrical Bodies in Contact, With Application to Contact of Gears and of Locomotive Wheels. H. Poritsky. *Journal of Applied Mechanics,* v. 17 (*Transactions of the American Society of Mechanical Engineers,* v. 72), June 1950, p. 191-201.

Theoretical discussion. (Q25, T7, T23)

419-Q. Lateral Buckling of Simply-Supported I-Beams. N. C. Cyr and R. A. Hechtman. *Trend in Engineering at the University of Washington,* v. 2, July 1950, p. 13-16.

Eighteen tests were made to verify a new formula for the lateral buckling of rolled steel wide-flange beams and I-beams. Compares values of nominal bending strength predicted by theoretical analyses with those values determined experimentally. Results indicate that the yield point of steel as well as the modulus of elasticity is necessary to define the buckling strength of the I-beams in this range of the slenderness ratio. (Q28, ST)

420-Q. The Mechanical Properties Available in Cast Iron. J. E. Hurst. *Pig Iron Rough Notes,* Spring-Summer, 1950, p. 11-16.

General discussion. (To be continued.) (Q general, CI)

421-Q. Machine for Testing Rails in Bending Fatigue. Luen B. Banks. *Engineering,* v. 169, May 26, 1950, p. 585-587.

Rails tested are high-tensile steel with a decarburized surface. (Q7, Q5, T23, CN)

422-Q. Yield Points in Zinc Crystals. *Metal Industry,* v. 76, May 26, 1950, p. 422.

(Q23, Zn)

423-Q. An Account of M. Henri M. Schnadt's Ideas on the Strength of Materials, and His Testing Methods. *Transactions of the Institute of Welding,* v. 13, Apr. 1950, p. 41-56.

Theory of fracture, stress, and structure. New testing technique based on breaking of notched bending specimens in a Charpy machine; test pieces can also be used for static bend tests. Application to steel and to welding. Data for openhearth and bessemer steels and for weld metals. (Q6, K9, ST)

424-Q. Research on Welded Structural Steelwork. J. W. Roderick. *Transactions of the Institute of Welding,* v. 13, Apr. 1950, p. 57-63.

Behavior of rigid frame structures in the plastic range, stressing thinking in terms of factored loads rather than permissible stresses. (Q25, K general, T26, CN)

425-Q. The Application of the Resonance Vibration Method to the Fatigue Testing of Spot Welded Light Alloys Structures. R. Weck. *Welding Research,* v. 4 (bound with *Transactions of the Institute of Welding,* v. 13), Apr. 1950, p. 33r-38r.

Tests were exploratory, investigating experimental difficulties likely to arise in fatigue testing spot welded Al alloy structures. (Q7, K3, Al)

426-Q. An Attempt To Find an Explanation and Working Theory of Cylinder Liner Wear, Compared With Practical Observations. H. Bergenheim. *Journal of the American Society of Naval Engineers,* v. 62, May

1950, p. 451-461. Reprinted from *British Motor Ship*, Dec. 1949.

Three processes occurring during combustion in an internal-combustion engine (electrochemical, oxidation, and detonation), and their results with respect to metallic wear and corrosion. Experimental work, shipboard observations, and results of diesel-oil examination. Conclusions are summarized. (Q9, R1, R2, T25, ST)

427-Q. Analysis of a Monocoque Aluminum Semi-Trailer. J. H. Dunn and R. L. Moore. *Automotive Industries*, v. 102, June 15, 1950, p. 42-43, 60, 62.

Correlation of design theory with actual stress measurements on loaded trailers. (Q25, T21, Al)

428-Q. Toughness of Titanium. R. K. Pitler and L. D. Jaffe. *Metal Progress*, v. 57, June 1950, p. 776-778.

Effect of temperature on impact strength of commercially pure Ti and one Ti alloy was studied. True stress-true strain tests were made on commercially pure Ti to investigate its strain hardening. (Q23, Ti)

429-Q. Binary Iron Alloys. *Metal Progress*, v. 57, June 1950, p. 802, 804, 806. Translated and condensed from "The Hardening and Softening of Binary Alloys of Iron", M. M. Shteinberg, *Stal* (Steel), v. 7, 1947, p. 1107-1110.

Purpose of study was to determine the influence of alloying elements dissolved in ferrite on its hardness, work hardening, and softening during heating. An induction furnace was used to melt a 44-lb. heat of each alloy, in which Armco iron was the base metal. (Q29, AY)

430-Q. Plasticity in Rolling. *Metal Progress*, v. 57, June 1950, p. 838-839. Translated and condensed from "Estimation of the Plasticity of Metals and Alloys Suitable for Hot Rolling or Forging", by Yu. M. Chizhikov, *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, 1949, p. 191-199.

Various methods, including the wedge-rolling method; attempts to show its superiority over other methods. The test is carried out on either cast or wrought specimens of square or rectangular cross section. The specimen is rolled in rolls of constantly varying diameter so that reductions varying from 0 to more than 75% are obtained. Limit of plasticity is taken as the value of relative reduction of height. (Q23, F23)

431-Q. What Tensile Properties of Metals Mean in Design. John B. Campbell. *Materials & Methods*, v. 31, June 1950, p. 49-53.

Simple explanation of practical meaning of tensile properties, showing how they should be used in metals selection and design. (Q27)

432-Q. The Effect of Alloying Elements on the Plastic Properties of Aluminum Alloys. J. E. Dorn, P. Pietrokowsky, and T. E. Tietz. *Journal of Metals*, v. 188, July 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 188, 1950, p. 933-943.

Results of an extensive investigation of plastic properties of binary Al alloys in an attempt to clarify the general problem of solid-solution hardening. Tensile tests were conducted at 78, 116, and 194° K. following a standard recrystallization treatment for uniform grain size. Each specimen was examined by X-rays before and after tensile testing. Effects of grain size, test temperature, and alloying elements on true stress vs. true strain curves are shown graphically. Changes in lattice parameter corresponding to 1 at. % of alloying element were determined. Shows that Al contributes about 2 electrons per atom toward the metallic bond in its alloys. 24 ref. (Q23, N7, Al)

433-Q. The Properties of Some Magnesium-Lithium Alloys Containing Aluminum and Zinc. Robert S. Busk, Donald L. Leman, and John J. Casey. *Journal of Metals*, v. 188, July 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 188, 1950, 945-951..

Mechanical properties and phase-temperature relationships. Shows that the strengths of some of these alloys can be tripled by heat treating and aging but that the high strength is accompanied by brittleness and lack of stability. (Q23, N7, Mg)

434-Q. A Quantized Theory of Strain Hardening as Applied to the Cutting of Metals. Milton C. Shaw. *Journal of Applied Physics*, v. 21, June 1950, p. 599-606.

Theory of strain hardening which utilizes the fact that metals deform blockwise rather than continuously. A metal is assumed to possess an orderly array of weak spots through which slip planes pass. The slip displacement which occurs upon a single plane is related to the spacing of weak points and the slip-plane inclination. Use of a linear relation between shear-plane displacement and resisting shear stress enables mean shear stress to be computed. Two examples are considered. (Q24)

435-Q. The Use of the Torsion Test. F. G. Tatnall. *Instruments,* v. 23, June 1950, p. 564, 566.

Advantages of torsion test under certain conditions other than in testing parts, such as axles and shafts. It tests materials in direct shear; it is a test for brittle materials, a sensitive test for surface corrosion, and has been used as an accelerated creep test. (Q1)

436-Q. Babcock & Wilcox Company Installs New Laboratory Equipment for Creep and Stress Runture Studies. *Industrial Heating,* v. 17, June 1950, p. 988. 990. 992, 994.

(Q3, Q4)

437-Q. Stress Analysis of Automotive Cylinder Blocks. Martin A Erickson. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950 ("Symposium on Testing of Cast Iron With SR-4 Type of Gage"), p. 2-10; joint discussion, p. 19-20.

Use of electrical-resistance type SR-4 gages in the determination of mechanical properties of cast iron. An example shows use of strain gages in the stress and strength analysis of an experimental automotive cylinder block. (Q25, T25, CI)

438-Q. Residual Stresses in Cylinder Blocks. R. J. King. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950 ("Symposium on Testing of Cast Iron With SR-4 Type of Gage"), p. 11-15; joint discussion, p. 19-20.

Methods used on Diesel-engine cylinder blocks at Caterpillar Tractor Co. (Q25, T25, CI)

439-Q. An Analysis of Locked-In Stresses in Automotive Cylinder Blocks. S. J. Stockett and H. W. Lownie, Jr. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950 ("Symposium on Testing of Cast Iron With SR-4 Type of Gage"), p. 16-18; joint discussion, p. 19-20.

Diagrams show method of attachment of three types of SR-4 gages. Where space permitted and the orientation of the stresses was not known, rectangular strain rosettes of the AR-1 type were used. Where orientation of the stresses could be predicted, single-element type A-1 gages were used. Single-element Type A-7 gages were used where the area of particular interest was too small to use Type A-1. Data are tabulated. (Q25, T25, CI)

440-Q. Strain Testing of Crankshafts, Engine Frames, and Cylinders. H. M. Hardy and T. O. Kuivinen. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950 ("Symposium on Testing of Cast Iron With SR-4 Type Gage"), p. 21-28.

Some examples of wire-resistance strain gage testing of cast iron machine parts to determine design weaknesses. Design modifications were made on cast crankshafts, engine frames, and compressor cylinders before such parts were placed in production. (Q25, T25, CI)

441-Q. Strain Gage Tests on Diesel Cylinder Blocks, Heads, and Pistons. C. L. Newton and J. D. Swannack. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950, ("Symposium on Testing of Cast Iron With SR-4 Type of Gage"), p. 29-33.

Tests made on the cylinder block, piston, and cylinder head of a large diesel engine, to determine the approximate magnitude of stress in these parts under operating conditions. (Q25, T25, CI)

442-Q. Stress-Strain Tests on Rectangular Cast Iron Beams. Oliver Smalley. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950 ("Symposium on Testing of Cast Iron With SR-4 Type of Gage"), p. 34-43; joint discussion, p. 50-52.

Tests were conducted on Types GM and GA Meehanite metal. Details of procedure and results. (Q25, CI)

443-Q. Stress-Strain Tests on Various Cast Iron Beam Sections. H. M. Hardy and T. O. Kuivinen. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950 ("Symposium on Testing of Cast Iron With SR-4 Type of Gage"), p. 44-49; joint discussion, p. 50-52.

Results of stress distribution tests on certain cast beams show why iron has a high modulus of rupture in bending, and serve to evaluate normal bending tneory in the fatigue range. (Q25, Q5, CI)

444-Q. Stress Analysis of a Cast Iron 125-lb. Valve Assembly. V. T. Malcolm and S. Low. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950 ("Symposium on Testing of Cast Iron With SR-4 Type of Gage"), p. 53-59.

Test procedure and results obtained. (Q25, T7, CI)

445-Q. Stress Analysis of a Cast Iron Split Tapping Sleeve. E. C. Sears, J. W. Miner, and E. D. McCauley. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950 ("Symposium on Testing

of Cast Iron With SR-4 Type of Gage"), p. 60-64.

The SR-4 strain gage was used to determine the magnitude of the stresses produced in a cast-iron sleeve during assembly and while subjected to internal pressure. Object of the study was to reduce these stresses by proper changes in design. This fitting is used to cut into a 6-in. gas main for a 4-in. branch connection without interrupting service on the main. Four sleeves were tested, two of original design, a third incorporating two design changes, and a fourth having an additional design change. (Q25, CI)

446-Q. Stress Analysis of Cast Iron for Valve Parts. Harold Wyatt. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950 ("Symposium on Testing of Cast Iron With SR-4 Type of Gage"), p. 65-67.

Technique using SR-4 strain gages. It involves obtaining a stress-strain curve to fracture and a complete set of stress-strain curves for different load levels within a working range. These curves are then used to evaluate the determined strains. (Q25, T7, CI)

447-Q. Residual Stresses in Cast Iron Deaerating Trays. J. A. Cameron. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950 ("Symposium on Testing of Cast Iron With SR-4 Type of Gage"), p. 68-69.

Tensile stresses very closely approaching the tensile strength of the material were found in certain areas of the castings. As a result, subsequent production parts have been given a stress-relief heat treatment intended to reduce residual stresses and eliminate field difficulties. (Q25, J1, CI)

448-Q. Some Strain Gage Studies of Cast Iron Punch Press Frames. Given A. Brewer. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950 ("Symposium on Testing of Cast Iron With SR-4 Type of Gage"), p. 70-72.

Strain-gage installation and application of results to redesign. (Q25, T5, CI)

449-Q. Stress Determination in Cast Irons for Railroad Service. R. A. Flinn and R. J. Ely. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950 ("Symposium on Testing of Cast Iron With SR-4 Type of Gage"), p. 73-83; discussion, p. 84-85.

Indicates that shape and amount of graphite may normally change modulus of elasticity from 26×10^6 to 10×10^6 psi. Total elongation varies from 5.5 to 0.18% and tensile strength from 78,000 to 25,000 psi. Type of matrix may also affect the stress-strain curve. The measurement of strains during press fitting, and determination of residual stresses after different types of heat treatment. The apparent anomaly of tensile cracks in a quenched bore surface under residual compressive stress is explored. Different cases of slow cooling, resulting in opposite residual stresses, are analyzed. (Q25, T23, CI)

450-Q. Location and Measurement of Stresses in Gray Iron Tractor Castings. H. Bornstein. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950 ("Symposium on Testing of Cast Iron With SR-4 Type of Gage"), p. 86-89.

Use of brittle-lacquer and resistance-type gages. (Q25, T21, CI)

451-Q. Stress-Strain Studies of Cast Iron for Textile Machinery Parts. Victor E. Hillman. *American Society for Testing Materials,* Special Technical Publication No. 97, 1950 ("Symposium on Testing of Cast Iron With SR-4 Type of Gage"), p. 90-92.

Use of SR-4 gages. (Q25, T29, CI)

452-Q. Carrying Capacity of Simply Supported Mild Steel Beams. J. W. Roderick and I. H. Phillipps. "Engineering Structures" (Academic Press, New York, 1949), p. 9-47; discussion, p. 47-48.

Reviews investigations of plastic theory for mild steel. Concludes that, for the annealed or normalized condition, the version of Robertson and Cook represents most satisfactorily the behavior of a member subjected to pure bending. This is also borne out by tests on simply supported beams subjected to symmetrical two-point loadings. Tests under central concentrated loads, however, suggest that the stress concentration produced by the load may often be sufficient to modify considerably the bending-stress distribution assumed by Robertson and Cook. 54 ref. (Q23, Q5, CN)

453-Q. Performance of Laterally Loaded Channel Beams. G. Winter, W. Lansing, and R. B. McCalley. "Engineering Structures" (Academic Press, New York, 1949), p. 49-66, 68-92; discussion, p. 67.

In light-gage steel, construction members are produced by cold forming of sheet steel. Methods of determining the spacing and strength of bracing required to counteract the twisting tendency of such members.

A general theory of elastic behavior of such members allows determination of stresses and rotations of channels loaded by forces in the plane of the web. Test information on ultimate carrying capacity as it is affected by location of braces. (Q21, CN)

454-Q. The Shortening Effect; A Non-Linear Feature of Pure Torsion. M. S. G Cullimore. "Engineering Structures" (Academic Press, New York, 1949), p. 153-163; discussion, p. 163-164

Two sets of experiments consisting, first, of measurements of longitudinal strains caused by pure torsion in Al alloy I and Z-sections, and second, of accurate determination of the torque-twist relationship of an Al alloy Z-section. Results of both experiments indicated that the extension of Weber's analysis to thin-walled structural sections was satisfactory. An attempt was made by the author to show a connection between shortening stresses and position of axis of twist in a bar under pure torsion. (Q1, Al)

455-Q. Investigations on Aluminum Alloy Riveted Joints Under Static Loading. A. J. Francis. "Engineering Structures" (Academic Press, New York, 1949), p. 187-215; discussion, p. 215-216.

Behavior of statically-loaded riveted joints of the type in which frictional effects are negligible. For joints under axial tensile load, a distribution method is given for determining theoretically the loads carried by the rivets in the elastic range. For eccentrically loaded joints, it is found theoretically that, in the elastic range, loads carried by the rivets differ considerably from those given by the conventional method. Experiments confirm the theory and also show that failing load of an eccentrically loaded joint may be appreciably greater than the conventional value. (Q21, Al)

456-Q. Review of the Testing of Structures. J. B. B. Owen. "Engineer-Structures" (Academic Press, New York, 1949), p. 241-258; discussion, p. 258. Techniques for testing structures to destruction by applying slowly increasing loads are critically reviewed. Endurance testing; and the ease with which strain measurements can be made with pulsating-load machines in contrast to elaborate wiring systems associated with electric strain-gage techniques. 23 ref. (Q23, Q25)

457-Q. The Fatigue of Metals. R. C. Thurston. *Canadian Metals,* v. 13, June 1950, p. 8-11, 48-49.

Some of the factors which affect fatigue resistance of metal parts in service. The nature of fatigue; the S-N curve and its derivation; stress-raisers; machining and polishing; geometry of surface; shot peening; cold rolling; presetting or scragging; cyaniding, carburizing, and nitriding; and metallic surface coatings. 12 ref. (Q7)

458-Q. Ductility Testing of Aluminum-Alloy Sheets by Free-Cone Bend Test. W. Thompson. *Sheet Metal Industries,* v. 27, June 1950, p. 503-507, 512.

See abstract from *Metallurgia,* item 321-Q, 1950. (Q5, Al)

459-Q. Creep Testing by a Cantilever-Bending Method. G. T. Harris and H. C. Child. *Journal of the Iron and Steel Institute,* v. 165, June 1950, p. 139-144.

Cantilever-bending creep testing is shown to have advantages over tensile testing for high temperatures and where the preparation of specimens must be reduced to a minimum, such as for unmachinable materials. There is good correlation between results obtained by this method and conventional testing at plastic strains up to 1.0%. Test data is for heat resisting steels. (Q3, SS)

460-Q. The Effect of Cold-Work on Steel. Introduction. J. H. Andrew and H. Lee **Sec. I. Effect of Carbon on the Work-Hardening Properties of Steel.** J. H. Andrew, H. Lee, P. L. Chang, B. Fang, and R. Guenot. **Sec. II. Effect of Cold-Work Upon Electrical Resistivity in Steel.** J. H. Andrew, H. Lee, P L. Chang, and R. Guenot. *Journal of the Iron and Steel Institute,* v. 165, June 1950, p. 145-184.

Introduction: Various theories. Sec. I: Results of hardness, dilatation, density, and thermomagnetic measurements on cold drawn specimens of a series of plain carbon and alloy steels. Results of X-ray and micrographic examination of cold drawn, high-carbon steel. Sec. II: Results of electrical resistivity measurements on cold drawn wires, both at room temperature and during or after subsequent heating. Effect of cementite distribution upon resistivity of steel after cold drawing. 29 ref. (To be concluded.) (Q23, P15, ST)

461-Q. Bars in Torsion—Methods for Analyzing Torsional Shear Stress. Walter W. Soroka. *Machine Design,* v. 22, July 1950, p. 120-124.

Techniques for study of torsional shear-stress distributions in uniform bars of arbitrary cross section.

Numerical iteration procedure, electrical-resistance networks, electrically conducting sheets, membranes, the hydrodynamic simulator, and a three-dimensional photoelastic stress-freezing method. (Q1)

462-Q. Yield Conditions in Plane Plastic Stress. P. G. Hodge, Jr. *Journal of Mathematics and Physics,* v. 29, Apr. 1950, p. 38-48.

Mathematical analysis. 14 ref. (Q23)

463-Q. Report of Committee B-9 on Metal Powders and Metal Powder Products. *American Society for Testing Materials,* Preprint 8a, 1950, 4 pages.

Committee recommendations and diagrams for flat, unmachined and round, machined tensile-test bars for powdered metals. (Q general, H general, S22)

464-Q. Reproducibility of Results of Tension Tests on Specimens Prepared From Cast Steel Coupons. H. A. Schwartz and W. K. Bock. *American Society for Testing Materials,* Preprint 16, 1950, 9 pages.

Degree of reproducibility of the usual static tensile properties of grade "B" steel as determined on test coupons of several designs. Results of single tests or average of a small number of tests are shown to be inadequate for determining mechanical properties of a given steel cast in a given form of coupon. (Q27, CN)

465-Q. The Influence of Strain Rate on Some Tensile Properties of Steel. D. S. Clark and P. E. Duwez. *American Society for Testing Materials,* Preprint 17, 1950, 16 pages.

Inability of impact tests to reveal the true influence of strain rate on tensile properties is demonstrated. Fundamental requirements of a device by which strain-rate effects can be studied and details of apparatus constructed. Results of static and strain-rate tests for three different steels. (Q27, Q6, ST)

466-Q. Effects of Grinding and Other Finishing Processes on the Fatigue Strength of Hardened Steel. L. P. Tarasov and H. J. Grover. *American Society for Testing Materials,* Preprint 18, 1950, 20 pages.

Investigation of the fatigue strength of a ball-bearing type steel, similar to type 52100, at Rockwell hardnesses of C-45 and C-59. Endurance limits of round bars were affected relatively little by surfacing processes and the effects of a given process were not necessarily consistent for the two hardness levels. In no case did gentle grinding prove detrimental to fatigue properties. 14 ref. (Q7, G18, G19, AY)

467-Q. Rockwell C Hardness on Cylindrical Steel Specimens. Frank W. Hussey *American Society for Testing Materials,* Preprint 20, 1950, 10 pages.

A series of more than 2800 individual hardness readings were made on the flat and curved surfaces of carefully prepared steel specimens of small diameter to determine deviations of hardness readings taken on curved surfaces from "true" values of flat areas. Resultant deviations, when plotted, indicate line relationships of such slight curvatures that straightline averages, obtained by the method of least squares, were utilized and considered sufficiently accurate for all practical purposes. Correlation curves are presented for obtaining actual Rockwell C hardness values from measurements on cylindrical surfaces of several diameters. (Q29, CN)

468-Q. Tensile Properties of Some Aircraft Structural Materials at Various Rates of Loading. Richard F. Klinger. *American Society for Testing Materials,* Preprint 25, 1950, 16 pages.

Effect of rate of loading in tension was determined at room temperature on nonmetallic and metallic aircraft structural materials. Stress-strain curves and ultimate strength values, and rate of loading vs. strength relationships. Results indicate a pronounced increase of ultimate and yield strength values with increased rate of loading for several plastic materials. Bare 24S-T and 75S-T Al alloys showed little change in yield strengths with rate of loading. (Q27, T24, Al)

469-Q. A Method for Making Tension Tests of Metals Using a Miniature Specimen. R. L. Templin and W. C. Aber. *American Society for Testing Materials,* Preprint 28, 1950, 7 pages.

Apparatus and procedure using specimens 0.05 in. in diam. (Q27)

470-Q. Effects of Anodic Coatings on the Fatigue Strength of Aluminum Alloys. G. W. Stickley and F. M. Howell. *American Society for Testing Materials,* Preprint 32, 1950, 8 pages.

Fatigue tests on 17S, 25S, 75S, and B355. (Q7, L19, Al)

471-Q. Combined Tension-Torsion Creep-Time Relations for Aluminum Alloy 2S-O. Joseph Marin, J. H. Faupel, and L. W. Hu. *American Society for Testing Materials,* Preprint 33, 1950, 17 pages.

Investigation on the combined stress-creep properties of Alcoa 2S-O.

Combined states of stress were produced by subjecting thin-walled tubular specimens of circular cross-section to various combinations of axial tension and torsion. Minimum constant creep rates for various values of the stresses and for ratios of the biaxial principal stress from 0 to −1.0 were found to be in approximate agreement with values predicted theoretically using simple tension-creep test results.
(Q27, Q1, Q3, Al)

472-Q. The Effect of Various Treatments on the Fatigue Strength of Notched S-816 and Timken 16-25-6 Alloys at Elevated Temperatures. W. E. Jones. Jr. and G. B. Wilkes, Jr. *American Society for Testing Materials,* Preprint 35, 1950, 17 pages.

Various corrective treatments were tried, such as shot peening, coining, and heat treating, to improve notched strength. Ground notches tend to contain tensile stresses to a degree depending upon severity of grinding. Shot peening overcomes these stresses and introduces compressive stresses, improving fatigue strength. Several general conclusions are drawn regarding notches and treatments intended to reduce their damaging effect.
(Q7, G23, Co, SG-h)

473-Q. Hardened Alloy Steel for Service up to 700 F. G. V. Smith, W. B. Seens, and E. J. Dulis. *American Society for Testing Materials,* Preprint 36, 1950, 11 pages.

Miscellaneous mechanical properties of two steels, SAE 4340 and 0.40% C Ni-Cr-Mo-V, quenched and tempered to a hardness of Rockwell C-43, then tested in tension at 75, 500, 600, and 700° F., in compression at 75° F., for creep-rupture strength at 500, 600, and 700° F., and for Charpy impact strength between 75 and 315° F.
(Q general, AY)

474-Q. Hardening of Austenitic Stainless Steels by Mechanical Working at Sub-Zero Temperatures. N. A. Ziegler and P. H. Brace. *American Society for Testing Materials,* Preprint 39, 1950, 19 pages.

Deformation by shot peening, forging, rolling, and wiredrawing. Effect of temperature of plastic deformation, and of working and aging time and temperature. Tension, torsion, wear, and corrosion tests.
(Q general, F22, F23, F28, G23, SS)

475-Q. Study of Deformation at High Strain Rates Using High-Speed Motion Pictures. Herbert I. Fusfeld and Josephine Carr Feder. *American Society for Testing Materials,* Preprint 42, 1950, 5 pages.

A shadow technique is used which permits measurements of strain and of neck shape throughout a tension test at high speeds. The method was applied to obtain curves of sharpness of the neck vs. strain, data similar to that used by P. W. Bridgman to correct stress-strain curves for true tensile stress once necking has set in. Materials tested were 24S-T and 75S-O Al, 70-30 cartridge brass, and cold rolled SAE 1020 steel.
(Q27, Al, Cu, CN)

476-Q. The Influence of Specimen Dimension and Shape on the Results in Tension Impact Testing. D. S. Clark and D. S. Wood. *American Society for Testing Materials,* Preprint 43, 1950, 9 pages.

Data showing that it is necessary to maintain a ratio of specimen length to diameter of at least 13 in order clearly to reveal a critical impact velocity. Results of tests show that, for a constant cross-sectional area, shape of the cross section of the specimen does not alter tensile-impact characteristics. Tests were on SAE 1020 cold rolled steel, annealed steel, and annealed copper. 11 ref. (Q27, CN, Cu)

477-Q. Some Notes on the Structure and Impact Resistance of Columbium-Bearing 18-8 Steels After Exposure to Elevated Temperatures. W. O. Binder. *American Society for Testing Materials,* Preprint 44, 1950, 19 pages.

Influence of Cb on impact properties of 18-8 steels was studied in steels containing 8-16% Ni and 0-3% Cb. Addition of more than 2% Cb decreases toughness in the annealed condition due to formation of M_6C carbide and Fe_3Cb_2. Positive X-ray identification of sigma phase was obtained after long periods at 1200° F. for 8-16% Ni and 0.75-3% Cb.
(Q6, M26, SS)

478-Q. Sigma Phase in Several Cast Austenitic Steels. V. T. Malcolm and S. Low. *American Society for Testing Materials,* Preprint 51, 1950, 7 pages.

Six materials commonly used for cast valves and fittings were investigated, three cast 18-8 alloys and three cast 16-35 alloys, with respect to embrittling effect of sigma phase after exposure to temperatures of 1000-1500° F. Embrittling effect was determined by means of keyhole-notch Charpy impact testing at both room and elevated temperatures. Identification of the sigma phase was made by means of metallographic and X-ray diffraction techniques.
(Q6, M26, SS)

479-Q. The Effect of Environment on the Stress-Rupture Properties of Metals at Elevated Temperatures. O. Cutler Shepard and Willis Schalliol. *American Society for Testing Materials,* Preprint 58, 1950, 5 pages.

Stress-rupture tests in controlled atmospheres were made with low-carbon steels and with Hastelloy "C". Small differences in the composition of environment produced relatively large differences in the amount of intergranular cracking and in time to failure. (Q4, CN, Ni)

480-Q. Report of Committee E-1 on Methods of Testing. *American Society for Testing Materials,* Preprint 100, 1950, 31 pages.

Includes miscellaneous committee recommendations, tentative method of verification and classification of extensometers, and test for Brinell hardness of metallic materials. Effect of speed of testing on fatigue test results and the Mullen bursting strength test as a means of determining the strength of annealed aluminum foil. (Q general, Al)

481-Q. Report of Committee E-9 on Fatigue. *American Society for Testing Materials,* Preprint 107, 1950, 11 pages.

A survey of fatigue projects throughout the U. S. and Canada. Current projects at each company, university, or research institute are listed. Items on which information is needed. (Q7)

482-Q. Fatigue Strength of Cast Crankshafts. H. R. Mills and R. J. Love. *Institution of Mechanical Engineers, Proceedings* (Automobile Div.), part 3, 1948-49, p. 81-88; discussion, p. 88-99.

Results of a systematic investigation of effects of proportions of a cast crankshaft on its bending fatigue strength. A single-throw shaft 4½ in. diam. had its different dimensions varied one at a time over a range which covered the usual practical proportions. Tests on a geometrically similar shaft of 2¼ in. diam. were also included. Most of the conclusions apply equally to forged and cast crankshafts. Refers also to tests made on a number of different cast iron and cast steel crankshafts of the same design, to determine their merits as crankshaft materials. (Q7, T7, CI)

483-Q. Design and Construction of Equipment for a Small Stress-Rupture Creep Laboratory. F. C. Child. *Metallurgia,* v. 42, June 1950, p. 37-44.

Experience in the development of a creep testing laboratory for life-to-rupture tests on materials at 900° C. using miniature creep testing machines. Although designed for high-temperature testing, the apparatus has given satisfactory performance, with only minor alterations, at temperatures as low as 400° C. (Q3)

484-Q. Apparatus for the Measurement of Creep Under Fluctuating Stress. W. R. Tyldesley. *Metallurgia,* v. 42, June 1950, p. 45-48.

Stress system comprises a steady load on which is superimposed a smaller load fluctuating at the rate of 100 cycles per sec. 19 ref. (Q3)

485-Q. An Investigation Into the Relation of the Mechanical Properties of Ring Test Pieces to Those of Test Bars. E. R. Evans. *British Cast Iron Research Association Journal of Research and Development,* v. 3, June 1950, p. 421-440.

Properties of four types of cast iron as shown by ring-test pieces, bar-type test pieces machined from the same castings, and from separately cast test bars. Variation in properties of different parts of the same casting. (Q general, CI)

486-Q. A Few Short-Time, Growth and Creep Tests on an Unalloyed Pearlitic Grey Iron. J. W. Grant. *British Cast Iron Research Association Journal of Research and Development,* v. 3, June 1950, p. 441-445.

Results of three creep tests and a growth test at 500° C. and of short-time tensile tests at 400, 450, and 500° C. (Q3, Q27, CI)

487-Q. Remarks Concerning Particular Behavior of an Aluminum Grain During Mechanical Deformation. (In French.) Raymond Jacquesson, Paul Laurent, and Jack Manenc. *Métaux & Corrosion,* v. 25, Mar. 1950, p. 61-64.

Influence of surface condition on the behavior of crystalline grains, during mechanical deformation of Al. Under favorable conditions, a slight irregularity of the surface may modify considerably the dislocation of the crystals. (Q24, Al)

488-Q. Contribution to the Study of the Stainless Ferrosilicons. (Concluded.) **III. Mechanical and Chemical Properties.** (In French.) Robert Lefébure. *Métaux & Corrosion,* v. 25, Mar. 1950, p. 67-83.

Different methods for determining mechanical properties and corrosion resistance. Data for different compositions, and applications of the stainless ferrosilicons. 48 ref. (Q general, R11, Fe-n, SS)

489-Q. Importance of Plasticity to the Phenomena of Metal Fracture. (In French.) O. L. Bihet. *Revue de la Soudure; Lastijdschrift,* v. 6, No. 1, 1950, p. 20-30.

Problem was thoroughly investigated with particular emphasis on theories of fracture, dislocation, mechanism of cold hardening, and its influence on the brittleness of metals. Selection of steels for welded structures. 17 ref.
(Q23, Q26, T26, ST)

490-Q. Research on the Relation Between Formability (Stamping Properties) **of Metals and Their Tensile Strength.** (In French.) Claude Arbel. *Revue de Métallurgie,* v. 47, May 1950, p. 388-394.

For 65-35 brass annealed at 540° C., 18-8 stainless, commercial copper, and 3S-O and 52S-O annealed Al alloys. Method of investigation. Different factors affecting the above relation such as anisotropy are thoroughly analyzed.
(Q23, Q27, Cu, Al, SS)

491-Q. Micrographic Study of Plastic Deformation of α-Brass; Application to the Surface Structure Caused by Abrasion. (In French.) P. A. Jacquet. *Revue de Métallurgie,* v. 47, May 1950, p. 355-364; discussion, p. 364.

Two methods are analyzed: a method based on the phenomenon of crystalline continuity and a method based on microhardness. The technique of investigation. 16 ref.
(Q23, Q29, Cu)

492-Q. Evaluation of Creep Tests. (In German.) Nikolaus Ludwig. *Zeitschrift fur Metallkunde,* v. 41, Mar. 1950, p. 87-91.

The designer can apply H. Eckardt's exponential law in order to estimate, on the basis of experimentally established creep-stress results, the expected expansions, exceptions being materials with a tendency to hot shortness. If the material is to be used at temperatures exceeding 600° C., the estimates must be based on long-time creep test results. 20 ref. (Q3)

493-Q. Slip Tendencies of Metallic Structures of the Magnesium Group. (In German.) H. Seifert. *Annalen der Physik,* ser. 6, v. 6, Sept. 19, 1949, p. 10-17.

The extent to which experimental slip behavior conforms to formal geometrical rules. Dynamics of the slip process is hypothetically related to the anisotropy of the electron density of the metal structure as determined by Fourier analysis. Kinematic details of mechanical twin formation in the Mg group. 13 ref. (Q24, Mg, Zn, Cd)

494-Q. A Mechanical Device for Measuring Small Changes in Linear Dimensions. (In German.) Günther Leibfried. *Zeitschrift für Physik,* v. 127, May 5, 1950, p. 580-587.

Device records the plastic deformation curves of metal wires with great accuracy. Several results obtained with Al monocrystals.
(Q23, S14, Al)

495-Q. Effect of Grain Size of Quartz Dust on Wear Resistance of Different Pairs of Materials. (In German.) Karl Wellinger. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, May 21, 1950, p. 371-375.

Possible necessity of eliminating even the smallest dust particles from the air entering internal-combustion engines. Results show that rate of wear depends on the metal pairs present in cylinder and piston or piston ring, respectively; and that below particle sizes of 40μ, rate of wear drops rapidly with particle size. (Q9)

496-Q. Materialistic Principles in the Theory of Strength and Plasticity of Metals. (In Russian.) I. A. Oding. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Feb. 1950, p. 5-9.

Indicates the present-day trend in Russian metallurgical approach as being, not qualitative on the basis of fundamental investigations of test specimens, but toward quantitative investigation of mechanical properties of finished machine parts under service conditions. (Q23)

497-Q. Increasing Impact Strength. (In Russian.) G. I. Pogodin-Alekseev. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Feb. 1950, p. 17-20.

The problem of designing parts and structures for sharp impact stresses, with high capacity to absorb kinetic energy as well as high surface hardness, was investigated. Test specimens were all of the same cross-sectional area, and consisted of 1, 2, 3, or 4 sheets. A combination of hard and soft carbon steel sheets gives a strength close to the impact strength of single-sheet normalized test specimens and many times higher than that of cemented test specimens. Optimum combinations were determined. (Q6, CN)

498-Q. Fatigue Fracture of Machine Parts Operating Under Static Conditions. (In Russian.) M. M. Kobrin. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Mar. 1950, p. 18-20.

Causes of fatigue failure of the main thrust screw (carbon steel) of a plastic extrusion press. Repeated alternating tensile and bending stresses are caused by operating conditions. (Q7, CN)

499-Q. The Problem of Hot Cracks in Steel Castings. (In Russian.) V. N.

Saveiko. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Mar. 1950, p. 25-27.

Studied on cylindrical 0.3% C steel bars of different diameters. It was found that the safe compressive stress is almost completely independent of cross sectional area, and hot cracks are most liable where the cross-sectional area changes. (Q26, CI)

500-Q. New Method of Compression Testing. (In Russian.) K. K. Likharev. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Mar. 1950, p. 51-54.

Proposes, for testing of materials in the uniaxial, uniformly stressed state, use of hollow cylindrical test specimens whose ends are conical surfaces. The concentrations of local stresses encountered in conical solid specimens is thus eliminated. Tests of mild and red-hot steel, aluminum, silumin, brass, resins, and gypsum. Formulas for calculation of data. (Q28)

501-Q. Problems in the Theory of Plasticity. (In Russian.) S. I. Ratner. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Mar. 1950, p. 435-450.

Critical review and correlated discussion of recent literature (including non-Russian work). Tabular data for various common metals and alloys subjected to various heat treatments. 12 ref. (Q23)

502-Q. Relaxation of Austenitic Steel at Room Temperature. (In Russian.) I. A. Oding and E. N. Volosatova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Apr. 1, 1950, p. 659-662.

Investigated for an 18-8 austenitic steel and low-carbon α-iron. Relaxation was determined under initial stresses of 5, 10, 15, 20, 35, and 42 kg. per sq. mm. over a period of 1600 hr. Practical application indicated. (Q3, SS, Fe)

503-Q. Anisotropy of the Modulus of Elasticity of Ferromagnetic Monocrystals. (In Russian.) N. S. Akulov, I. P. Maxin, and Ya. I. Feld'shtein. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Apr. 11, 1950, p. 851-854.

Theoretically investigates the possibility of application of the formula for natural anisotropy by including an additional term, describing the additional elongation induced by magnetic mechanostriction. Applicability of this formula is proven by theoretical considerations and experimental data. (Q21, SG-n)

504-Q. Contribution to the Theory of Relaxation Phenomena in Solids. (In Russian.) B. N. Finkel'shtein and N. S. Fastov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Apr. 11, 1950, p. 875-878.

Attempts to formulate a new theory of relaxation on the basis of general thermodynamic consideration. Basic mathematical formulas of this theory are interpreted for different values of the variables. (Q3, P12)

505-Q. Criteria of Relaxation of Steels and Their Application. (In Russian.) I. A. Oding and V. Z. Tseitlin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Apr. 11, 1950, p. 883-886.

Proposes charting of relaxation curves on semilogarithmic coordinates. This method establishes in simple form two important criteria: coefficient of intragranular resistance; and, intergranular relaxation stability of the metal. Method of application, particularly to the problem of thermal resistance of metals. Relaxation curves for three austenitic steels at room temperature. (Q3, ST)

506-Q. Portable Unit Photographs Stress and Strain Curves. *Iron Age*, v. 166, July 13, 1950, p. 98.

Instrument manufactured by Baldwin Locomotive Works which may be used for load measurements, stress analysis, and function analysis during operation of equipment. (Q25)

507-Q. Hot Hardness of Hard-Facing Alloys. Howard S. Avery. *Welding Journal*, v. 29, July 1950, p. 552-578.

Hot hardness was surveyed at 600, 800, 1000 and 1200° F. for a number of hard-facing alloys, using a Rockwell diamond-indentor technique. Some indication of creep resistance is obtained by incorporating a time factor in the test. Arc welds, gas welds, and castings of wear-resistant alloys are included in the survey. For a few materials creep and stress-rupture data are correlated with hot hardness. 39 ref. (Q29, Q3, SG-m)

508-Q. Design Correlations for Cylindrical Pressure Vessels With Conical or Toriconical Heads. H. L. O'Brien, E. Wetterstrom, M. G. Dykhuizen, and R. G. Sturm. *Welding Journal*, v. 29, July 1950, p. 336s-342s.

Second part of an investigation of head-to-shell junctures of pres-

sure vessels conducted at Purdue University. Material was ASTM A-201 fire-box-quality steel. Includes tests on commercially fabricated vessels designed to correspond in a 6:1 ratio with two of the 8-in. diam. models previously tested. Curves illustrate the comparison between measured and computed stresses for 48-in. diam. vessels, along with conclusions. (Q25, K9, T26, AY)

509-Q. Effect of Grain Direction on Fatigue Properties of Aluminum Alloys. R. L. Templin, F. M. Howell, and E. C. Hartmann. *Product Engineering,* v. 21, July 1950, p. 126-130.

Since orientation of test specimens with respect to direction of working is known to have an effect on static mechanical properties, it it often assumed to have a similar effect on dynamic properties. Results of an intensive fatigue-testing program show this assumption to be erroneous for Al alloys. These results should influence design trends in highly stressed structures. 17 ref. (Q7, Al)

510-Q. Seven Causes of Railroad Diesel Engine Wear. *SAE Journal,* v. 58, July 1950, p. 18-21. Based on "Rates of Wear in Railroad Diesel Engines", by Ray McBrian and L. C. Atchison.

The seven main contributors to railroad diesel-engine wear are: Too high power output, excessive idling, low operating temperature, high-sulfur fuel, poor filtration, poor lube oil, and design shortcomings. Results of spectrographic analysis of lubricating-oil ash showing amount of metal pick-up for various conditions, which amount is directly related to wear. Metals determined were Cu, Sn, and Pb for bearings and thrust washers, Ag for wrist-pin bushings, and Fe for liner and ring wear. (Q9, T23)

511-Q. The Influence of Shape of Cross Section on the Flexural Fatigue Strength of Steel. T. J. Dolan, J. H. McClow, and W. J. Craig. *Transactions of the American Society of Mechanical Engineers,* v. 72, July 1950, p. 469-476; discussion, p. 476-477.

Above influence is not generally recognized. In order to obtain further information on its magnitude, flexural fatigue tests were made for four different shapes of cross section on two different steels. Results are compared and analyzed. Concludes that variations in residual stress or alterations of properties due to method of machining the different shapes play only a minor part in affecting relative endurance limits. Susceptibility to localized inelastic action governed by shape of cross section and by presence of "sore spots," such as outward projecting corners, are tentatively believed to be the primary elements leading to differences in flexural fatigue strengths. 12 ref. (Q7, ST)

512-Q. Allowable Eccentricity of Spherical Heads Convex to Pressure. R. G. Sturm, L. W. Smith, and H. L. O'Brien. *Transactions of the American Society of Mechanical Engineers,* v. 72, July 1950, p. 533-537; discussion, p. 538.

Variables and considerations in design of spherical heads or shells, initially out-of-round, when subjected to external pressure. A method of calculating charts for design purposes based upon the instantaneous modulus of elasticity. Calculations and charts for aluminum 3S-O, for 17-7 stainless steel, and for "A" nickel. (Q21, Al, SS, Ni)

513-Q. Analysis of Experimental Data Regarding Certain Design Features of Pressure Vessels. G. J. Schoessow and E. A. Brooks. *Transactions of the American Society of Mechanical Engineers,* v. 72, July 1950, p. 567-574; discussion, p. 574-577.

Analyzes data obtained by strain-gage experimental stress analysis on drum heads and nozzle openings in drum shells. The data are reduced to dimensionless form so that they may be applied to drums of other size and thickness but geometrically similar, and to illustrate more clearly the action of the drum in resisting pressure. Relationship between operating-stress level and service life. Effect of prestress created by overpressuring. (Q25, T26)

514-Q. Experimental Technique in Pressure-Vessel Testing. L. F. Kooistra and R. U. Blaser. *Transactions of the American Society of Mechanical Engineers,* v. 72, July 1950, p. 579-587; discussion, p. 587-589.

The latest designs of pressure vessels for high-pressure boiler service were investigated by means of experimental stress analysis and hydraulic fatigue tests. Methods were developed to measure strain on the inside as well as on the outside of pressure vessels under internal pressure. Pulsating hydraulic fatigue tests were conducted on full-scale high-pressure drums. Scale-model vesseis were similarly tested in a saturated-steam and water atmosphere of 2000 psi. (Q25, Q7, T26)

515-Q. Measuring Fringe Orders in Photoelasticity. W. A. P. Fisher. *Research,* v. 3, July 1950, p. 298-303.

Apparatus and procedures. 12 ref. (Q21)

516-Q. Damping Capacity. Part II. Effect of Conditions of Measurement. Edward Linacre. *Iron and Steel,* v. 23, June 1950, p. 285-288.

Continues descriptive review and correlation of the literature. 50 ref. (Q8)

517-Q. On the Inhomogeneity of Plastic Deformation in Metals. (In English.) W. Boas. *Helvetica Physica Acta,* v. 23, Feb. 3, 1950, p. 159-166.

Microscopic inhomogeneity of plastic deformation in metals and alloys due to crystal anisotropy and the presence of crystals of different structures. The importance of the inhomogeneity in relation to the theory of the deformation of crystal aggregates. Macroscopic inhomogeneity is produced by common methods of deformation. 11 ref. (Q24)

518-Q. Materials Testing and Strength Research in Germany in the Years 1939-1949. (In German.) E. Siebel. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 16, Apr. 1950, p. 97-114.

History of materials testing in Germany. Activities and advances of materials testing during the war and its revival after the war. Strength behavior under static and vibrating stresses. 30 ref. (Q general)

519-Q. Measuring Maximum Impact Force. (In German.) H. Mintrop. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 16, Apr. 1950, p. 119-124.

To test Hertz's theory and equations on the impact of solid elastic bodies, experiments were made in which polished metal spheres were dropped on different polished metal plates. Impact times were measured with the cathode-ray oscillograph and a slow-motion camera. 22 ref. (Q6)

520-Q. The Mechanical Properties of Titanium at Different Temperatures. (In German.) R. L. Bickerdike and D. A. Sutcliffe. *Metall,* v. 4, May 1950, p. 191-193.

Small amounts of O_2, N_2, and Si greatly increase the hardness and tensile strength of Ti without eliminating its ductility at room temperature. Elevated temperatures greatly decrease these properties. 16 ref. (Q23, Q29, Ti)

521-Q. Dimensional Considerations in Friction and Wear. C. Fayette Taylor. *American Society for Metals,* "Mechanical Wear", 1950, p. 1-7.

Lists symbols involved, defines certain technical terms, and gives some fundamental mathematical relations. (Q9)

522-Q. Wear in Diesel Engines. C. G. A. Rosen. *American Society for Metals,* "Mechanical Wear", 1950, p. 8-14; discussion, p. 14-16.

Factors affecting wear on cooperating surfaces—cylinder and piston ring, and crankshaft journal and bearing. Includes data on Rockwell hardness and wear rate for SAE 1045 steel. (Q9, T25, CN)

523-Q. Wear of Automotive Engine Cylinders and Piston Rings. Paul S. Lane. *American Society for Metals,* "Mechanical Wear", 1950, p. 17-43; discussion, p. 43-46.

Performance data, engine block design, and improvement in cylinder life, considering factors of metal structure, cleaning, precision boring, and surface finishing. Basic piston-ring design, improvement in rings through methods of fabrication, and causes and nature of wear. Materials are cast iron and carbon steel. 15 ref. (Q9, T21, CI, CN)

524-Q. Fuel and Lubrication Factors in Piston Ring and Cylinder Wear. A. G. Cattaneo and E. S. Starkman. *American Society for Metals,* "Mechanical Wear", 1950, p. 47-60; discussion, p. 60-72.

Testing technique and interpretation of wear data. Abrasive wear and corrosive wear particularly that resulting from sulfur and halides. 10 ref. (Q9, R1, T7, CN)

525-Q. Chemical Aspects of Wear and Friction. R. G. Larsen and G. L. Perry. *American Society for Metals,* "Mechanical Wear", 1950, p. 73-88; discussion, p. 88-94.

Oxidation of metal surface and of lubricant, physical adsorption of polar compounds, chemical vs. physical adsorption, competition of reactants for the surface, polymerization as a factor in lubrication, and orientation under shear. Data for mild steel, cast iron, and hard steel. 18 ref. (Q9, R2, CI, CN)

526-Q. The Vapor Lubrication of Graphite in Relation to Carbon Brush Wear. Robert H. Savage. *American Society for Metals,* "Mechanical Wear", 1950, p. 95-102; discussion, p. 102-108.

Adsorption films on graphite plates and in the lubrication of carbon brushes. Structure of the brush face and the carbon film. (Q9, C)

527-Q. Wear and Damage of Metal Surfaces With Fluid Lubrication, no Lubrication and Boundary Lubrication. F. P. Bowden and D. Tabor. *American Society for Metals,* "Mechanical Wear", 1950, p. 109-129; discussion, p. 129-144.

Considers the effect of flat and curved surfaces. 29 ref. (Q9)

528-Q. Wear in Steam Turbines. Norman L. Mochel. *American Society for Metals,* "Mechanical Wear", 1950, p. 145-162; discussion, p. 162-164.

Mechanical wear between various solid surfaces of a small mechanical drive turbine. Correction procedure. (Q9, T25)

529-Q. The Need for Studies of "Real" Hydrodynamic Lubrication. R. W. Dayton. *American Society for Metals,* "Mechanical Wear", 1950, p. 165-177; discussion, p. 177-180.

Types of hydrodynamic lubrication. Pressure coefficient of viscosity, deflection of surfaces, surface roughness, hypothetical mechanism of failure, and limits of hydrodynamic lubrication. 15 ref. (Q9)

530-Q. The Dielectric Strength of Oil Film in Plain Bearings. C. M. Allen. *American Society for Metals,* "Mechanical Wear", 1950, p. 181-191; discussion, p. 191-197.

Method of estimating minimum oil-film thickness. Effect of foreign material, of bearing material on dielectric breakdown, of lubricant on bearing performance, and of load and speed on breakdown potential. Use of bearing material on shaft and ultimate load-carrying capacity. (Q9, SG-c)

531-Q. Gear Wear as Related to Viscosity of Oil. H. Blok. *American Society for Metals,* "Mechanical Wear", 1950, p. 199-217; discussion, p. 217-227.

Discussed in connection with impact loading. Considers the elimination of viscosity as a hydrodynamic factor in assessing antiwelding properties of gear oils. Test methods and results. 22 ref. (Q9, T7)

532-Q. Surface Deterioration of Gear Teeth. J. O. Almen. *American Society for Metals,* "Mechanical Wear", 1950, p. 229-267; discussion, p. 267-288.

Normal, abrasive, corrosive and "run-in" wear (leveling of local projections on teeth by plastic deformation and lapping). Effects of welding, empirical formulas for design, and computation of welding susceptibility. Lubrication of teeth, pitting fatigue, residual stress, and tooth interference. (Q9, T7)

533-Q. Recent Roll Tests on Endurance Limits of Materials. E. Buckingham and G. J. Talbourdet. *American Society for Metals,* "Mechanical Wear", 1950, p. 289-302; discussion, p. 302-307.

Endurance-test machine and results on carbon, alloy, and toolsteels. (Q7, CN, AY, TS)

534-Q. Hardness and Its Influence on Wear. Ragnar Holm. *American Society for Metals,* "Mechanical Wear", 1950, p. 309-321; discussion, p. 321-329.

The theory of contact hardness and principles for correlating frictional wear measurements. 21 ref. (Q9, Q29)

535-Q. Wear of Metals Against Smooth Refractory Materials. Lowell H. Milligan. *American Society for Metals,* "Mechanical Wear", 1950, p. 331-339.

Results of an investigation in Norton Co. research laboratories on surface plates used in the machine tool industry as a plane surface of reference for measurements. Blocks of hardened toolsteel and cast iron were used in the tests. (Q9, CI, TS)

536-Q. Friction and Wear of Some Powder Metallurgy Bronzes. John Dedrick and John Wulff. *American Society for Metals,* "Mechanical Wear", 1950, p. 341-353; discussion, p. 353-358.

Test procedure. Results for friction and wear of basic components, copper and alpha-bronze binary alloys, and complex bronzes. (Q9, Cu)

537-Q. Summary of Factors in the Wear Process. John T. Burwell, Jr. *American Society for Metals,* "Mechanical Wear", 1950, p. 359-369.

Primary operating conditions, intermediate factors, and manifestations of wear. (Q9)

538-Q. (Book) **Mechanical Wear.** John T. Burwell, Jr., editor. 387 pages. 1950. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $6.50.

Includes 17 papers of a summer conference held June 1948 at M.I.T., which cover laboratory and service experience on wear and lubrication in internal combustion engines, steam turbines, brake materials, journal bearings, gears, electric brushes, surface plates, and cutting tools. Papers are abstracted separately. (Q9)

539-Q. (Book) **Engineering Structures.** 260 pages. 1949. Academic Press, Inc., 125 E. 234th St., New York 10. (Colston Papers, Vol II.)

Preface, introduction, list of members, and 15 papers presented at Symposium on Engineering Strucutres, Sept. 1949 at University of Bristol under the auspices of the Colston Research Society. Papers deal with theoretical and experimental analysis of stress in structures. Some are applicable to specific metals and alloys; others to

materials in general. Papers of the first type are abstracted separately. (Q25)

540-Q. (Book) **Stainless Steel Structural Design.** Michael Watter and R. A. Lincoln. 153 pages. Republic Press, Pittsburgh, $5.

Design procedure for calculating allowable loads for structures made of stainless steel. This procedure was developed and simplified by many applications at the Budd Company. Based on experience and testing at Allegheny Ludlum Steel Corp., it has proven very satisfactory. Data on physical properties of high-tensile, stainless steel strip, and practical engineering methods for determining the stresses in stainless steel structure elements, particularly behavior of columns. (From review in *Product Engineering.*) (Q25, SS)

541-Q. (Book) **Strength of Materials,** Ed. 5. James E. Boyd. (Revised by Samuel B. Folk.) 417 pages. McGraw-Hill Book Co., 330 West 42nd St., New York 18. $4.25.

In this revision, a conscious attempt is made to emphasize fundamentals of the theory and to accept the process of analysis in the application of mathematics to strength of materials. Assumes a knowledge of integral calculus and theoretical mechanics. (Q23)

542-Q. (Book) **Properties of Metals at Elevated Temperatures.** George V. Smith. 401 pages. McGraw-Hill Book Co., 330 West 42nd St., New York 18. (Metallurgy and Metallurgical Engineering Series.) $7.00.

A comprehensive summary of available knowledge on the effect of temperature on the properties of metals. Nature of plastic deformation and fracture of metals at ordinary and elevated temperatures. Effects of such variables as chemical composition, manufacturing practice, and heat treatment. Appendix describes the composition of "superalloys". (Q general, SG-h)

543-Q. (Book) **Symposium on Testing of Cast Iron With Sr-4 Type of Gage.** 92 pages. 1950. American Society for Testing Materials, 1916 Race St., Philadelphia 3. (Special Technical Publication No. 97.) $1.65 (to A.S.T.M. members $1.25).

Introduction plus 15 papers and accompanying discussion presented at 52nd annual ASTM meeting, Atlantic City, N. J., June 29, 1949. Individual papers are abstracted separately. (Q25, CI)

544-Q. (Book) **Residual Stresses in Metals.** W. M. Baldwin, Jr. 45 pages, 1949. American Society for Testing Materials, 1916 Race St., Philadelphia 3.

Edgar Marburg Lecture. Previously abstracted from *American Society for Testing Materials, Proceedings,* v. 49, 1949. See item 384-Q, 1950. (Q25)

545-Q. Alloys Widen Use of Titanium. John Anthony. *Iron Age,* v. 166, July 27, 1950, p. 60-62.

Properties of Ti and several alloys now being offered commercially in a wide range of fabricated products and forms. Mechanical-property data are tabulated. (Q general, Ti)

546-Q. Tests of Steel Girder Spans on the Chicago & North Western Railway; Advance Report of Committee 30—Impact and Bridge Stresses. *American Railway Engineering Association, Bulletin,* v. 52, June-July 1950, p. 1-91.

Analyzes test data secured on three deck-plate girder spans. Stresses were measured under 100 diesel and 386 steam locomotives by means of electromagnetic strain gages, with oscillograph recordings, in various parts of the bridges. Bridge details and strain-gage locations are shown diagrammatically. (Q25, T26, T23, CN)

547-Q. Properties of Alloy Steels. *Industrial Heating,* v. 17, July 1950, p. 1170, 1172, 1174.

Abstracts of the papers presented at Alloys Steels Session I, 31st annual convention of ASM, Cleveland, Oct. 1949. The four papers cover studies of the tensile properties of heat treated low-alloy steel at subzero temperatures, relationship of inclusions and transverse ductility in a Cr-Ni-Mo gun steel, constitution of high-speed steel as affected by V and C, and unnotched impact strength of high-speed steels. (Q general, N8, AY, TS)

548-Q. Conservation of Columbium. John F. Tyrrell. *Metal Progress,* v. 58, July 1950, p. 63-68.

To conserve columbium, it is important to substitute Type 321 (Ti-stabilized) stainless steel for Type 347 (Cb-stabilized) wherever it can be done without sacrifice in performance. Extensive experience shows no difference in service behavior between Types 321 and 347 in aircraft components operating up to about 1500° F. In fabrication and initial cost, there are definite advantages in using Type 321. Weldability, formability, sand castability, and mechanical properties are compared. 11 ref. (Q general, K9, SS)

549-Q. Test Bar Results Compared With Tests on Components. H. J.

Maier. *Metal Progress,* v. 58, July 1950, p. 72-75.

Critically discusses recent article by A. L. Boegehold (Mar. issue, item 203-Q, 1950). Includes Mr. Boegehold's reply. (Q25, J26, ST)

550-Q. Residual Stresses in Chromium-Plated Steel. Hugh L. Logan. *Metal Progress,* v. 58, July 1950, p. 75-76.

Recent tests at the National Bureau of Standards showed that the fatigue limits of steel specimens heated after plating first decrease and then increase with increased baking temperature. The decrease in fatigue limit was correlated with increased tensile stresses induced by low-temperature baking. (See abstract of "Effect of Chromium Plating on Endurance Limit of Steels Used in Aircraft", *Journal of Research of the National Bureau of Standards,* item 3B-219, 1949.) (Q25, L17, Cr, ST)

551-Q. Residual Stress and Fatigue Strength. D. Rosenthal and George Sines. *Metal Progress,* v. 58, July 1950, p. 76.

Shows experimentally that an improvement of almost 100% in permissible stress and a fatigue life increased by 10 times can be realized by changing residual stress from tension to compression. Data are for 61S-T6 Al plate. (Q25, Q7, Al)

552-Q. The Modulus of Elasticity—A Review of Metallurgical Factors. John E. Dorn and Thomas E. Tietz. *Metal Progress,* v. 58, July 1950, p. 81-84.

Data from the literature are correlated, graphed, and discussed. (Q21)

553-Q. Effect of Temperature on the Modulus of Elasticity. Charles W. Andrews. *Metal Progress,* v. 58, July 1950, p. 85-89.

New data on temperature variation of Young's modulus for the following metals: Stellite 21, Inconel, four austenitic stainless steels, Armco iron, SAE 4130, and 75S Al alloy. A dynamic method of testing was used in which the specimen is vibrated transversely at its resonant frequency. (Q21, Co, Ni, SS, Fe, AY, Al)

554-Q. Dynamic Modulus. *Metal Progress,* v. 58, July 1950, p. 96, 98, 100.

Complete details of theory and practice of method used in work described in article by Andrews (see item 553-Q, above). 10 ref. (Q21)

555-Q. Stress Analysis for Compressible Viscoelastic Materials. W. T. Read, Jr. *Journal of Applied Physics,* v. 21, July 1950, p. 671-674.

Mathematical methods of stress analysis for linear, compressible, viscoelastic or anelastic materials such as metals at high temperatures, or high polymers with small strains. For such materials stress, strain, and their time derivatives of all orders are related by linear equations with coefficients which are material constants. Fourier integral methods are used to show that static-elasticity solutions can be used to determine time-dependent stresses in visco-elastic bodies with any form of boundary conditions. (Q25)

556-Q. Interpretation of Fracture Markings. J. A. Kies, A. M. Sullivan, and G. R. Irwin. *Journal of Applied Physics,* v. 21, July 1950, p. 716-720.

Study of the sequence of events by which cracks "grow". A careful investigation was made of the origin, development, and characteristic pattern of markings left by rapidly moving fractures in a wide variety of materials. Characteristic markings indicating discontinuous propagation are found in fractures of plastics, metals, polycrystalline and single-crystal materials, coal, mica, etc. Results are sufficient to explain a number of well-known fracture markings and to clarify what is meant by brittleness and fracture velocity. (Q26)

557-Q. Testing Machines (Tension and/or Compression): Means of Regulating Testing Speed. H. L. McBride, compiler. *Materials & Methods,* v. 32, July 1950, p. 73.

Tabular presentation covers the various types. (Q27, Q28)

558-Q. Use of the Pendulum for the Study of Elastic Properties of Solids. M. LeRolland. *Non-Destructive Testing,* v. 8, Spring 1950, p. 16-19.

Fundamental physics of pendulum testing of metals and other solids. (Q21)

559-Q. Fitting Mathematical Theories of Plasticity to Experimental Results. F. D. Stockton and D. C. Drucker. *Journal of Colloid Science,* v. 5, June 1950, p. 239-250.

At present the analytical development of mathematical theories of plasticity for work hardening metals has far outstripped application and comparison with experimental information. Demands of experiment on theory using the classical data of Taylor and Quinney for illustration. Shows that the more varied the data the stress-strain law must fit, the more elaborate the mathematical relation required. Considers two fundamental questions: Are strain increments linear to the stress

increments; and is the plastic work per unit volume independent of the path of loading provided unloading is not taking place? (Q23)

560-Q. Effect of Variation in Rivet Diameter and Pitch on the Average Stress at Maximum Load for 24S-T3 and 75S-T6 Aluminum Alloy, Flat, Z-Stiffened Panels That Fail by Local Instability. Norris F. Dow and William A. Hickman. *National Advisory Committee for Aeronautics,* Technical Note 2139, July 1950, 24 pages.
(Q25, Al)

561-Q. An Investigation Into the Causes of Brittleness in Mild Steels. J. G. de Lattre. *Sheet Metal Industries,* v. 27, July 1950, p. 613-618, 628.
Systematic investigation of 20 samples from different steel plants using Thomas converters. Aging behavior, tensile strength, and percent elongation; micrographic and macrographic examination. Analogous observations on copper taken from the literature.
(Q23, M27, CN, Cu)

562-Q. Proposed New Hardness Scale; Russian Work on Instruments and Method. *Chemical Age,* v. 63, July 1, 1950, p. 19-20.
Summarizes work described in recent Russian paper. (Q29)

563-Q. Aircraft-Structure Testing Equipment at Farnborough. *Engineering,* v. 169, June 30, 1950, p. 717-718 + insert.
Equipment designed for testing structures having dimensions as great as 120 ft. (Q23)

564-Q. Where Is Cast Iron Going To? (Concluded.) P. A. Russell. *Foundry Trade Journal,* v. 89, July 6, 1950, p. 7-10; discussion, p. 11-13.
Damping capacity of nodular irons and future prospects. Possibility of solving the problems of phosphorus content, porosity and shrinkage, and marketing problems (psychological). (Q8, E25, CI)

565-Q. Properties of Cast Iron at Sub-Atmospheric Temperatures. F. N. J. Gilbert. *Institute of British Foundrymen,* Paper No. 964, 1950, 24 pages (Advance Copy).
Summarizes available literature for various cast irons. Tensile and impact properties at −100° C. or lower. Dilatation tests were carried out at high and low temperatures so that results can be compared and more knowledge gained of phase change. 15 ref. (Q23, N8, CI)

566-Q. Sand-Cast Test-Bars for Copper-Base Alloys. O. R. J. Lee and B. W. Peck *Institute of British Foundrymen,* Paper No. 967, 1950, 4 pages (Advance Copy); also *Foundry Trade Journal,* v. 89, July 13, 1950, p. 31-34; discussion, p. 34-35.
Determination of mechanical properties obtainable from sand-cast test bars. Results are compared with those obtained from D.T.D.-type bars. (Q general, E11, Cu)

567-Q. Deformation Characteristics of Five Grey Cast Irons at 400 Deg. C., 500 Deg. C. C. R. Tottle. *Institute of British Foundrymen,* Paper No. 973, 1950, 9 pages (Advance Copy).
Materials, testing procedure, and temperature control. Rupture, short-time tensile, creep, and stress-to-rupture tests. 15 ref. (Q3, Q4, CI)

568-Q. Testing the Metal or Testing the Casting; Some Notes on the New Swedish Grey-Iron Specification. Erik O. Lissel. *Institute of British Foundrymen,* Paper No. 976, 1950, 15 pages (Advance Copy).
Surveys the problem related to testing and specification of gray cast iron and gray iron castings. Compares British, American, and Swedish cast-iron specifications. 39 ref. (Q general, S22, CI)

569-Q. On the Correlation of the Directional Properties of Rolled Sheet in Tension and Cupping Tests. L. Bourne and R. Hill. *Philosophical Magazine,* ser. 7, v. 41, July 1950, p. 671-681.
Plastic anisotropy in rolled sheet was examined by tension and cupping tests. Earing positions are correlated with strain ratios measured in tension tests at various orientations to the direction of rolling. The materials used were Cu giving four ears at 45°, brass giving four ears at 50°, and brass giving six ears at 0° and 60°. Hill's theory of plastic anisotropy was found to be in good agreement with experimental data for materials producing four ears. The theory is extended to describe more complex states of anisotropy. 12 ref. (Q23, Cu)

570-Q. The Determination of the Principal Stress Differences at a Point in a Three Dimensional Photoelastic Model. H. T. Jessop and M. K. Wells. *British Journal of Applied Physics,* v. 1, July 1950, p. 184-189.
The method of recording results by stereographic projection. The universal tilting microscope stage and a brief investigation of its theory. (Q25)

571-Q. Influence of Lead Additions on the Mechanical Properties and Machinability of Some Alloy Steels. J. Woolman and A. Jacques. *Journal of the Iron and Steel Institute,* v. 165, July 1950, p. 257-267.

Mechanical properties, including fatigue resistance, of a series of normal and Pb-bearing carbon and alloy steels produced from the same melt, in various conditions of heat treatment, were determined in both longitudinal and transverse directions. Effect of Pb additions on machining properties was measured in turning, sawing, and drilling tests. Effect of additions of different-sized Pb shot. (Q general, G17, AY)

572-Q. The Sliding Surface. G. I. Finch. *Proceedings of the Physical Society,* v. 63, sec. B, July 1, 1950, p. 465-483.

The fundamental principles of lubrication and friction. Effects of materials in contact and crystalline structure changes due to frictional contact are illustrated by micrographs and by electron-diffraction patterns. Effects of oxide layers. 54 ref. (Q9)

573-Q. The Effect of Impurities on the Properties of Metals. C. H. Desch. *Institution of Mining and Metallurgy.* "The Refining of Non-Ferrous Metals —A Symposium", 1950, p. 9-24.

Previously abstracted from *Bulletin of the Institution of Mining and Metallurgy.* See item 3A-191, 1949. (Q general, C general)

574-Q. Buckling of Compressed Steel Members. (In English.) Georg Wästlund and Sven G. Bergstrom. *Acta Polytechnica* (Civil Engineering and Building Construction Series), v. 1, no. 10, 1949, 172 pages.

Previously abstracted from *Transactions of the Royal Institute of Technology,* no. 56, 1949. See item 195-Q, 1950. (Q28, ST)

575-Q. Theories of the Mechanism of Fatigue Fracture. (In French.) W. Boas. *Métaux & Corrosion,* v. 25, Apr. 1950, p. 100-104.

Theories based on experiences with polycrystalline metals; experiences with single crystals; recent progress in use of X-ray diffraction; recent theories. 22 ref. (Q7)

576-Q. Protection Against Wear. (In French.) H. Wahl. *Métaux & Corrosion,* v. 25, Apr. 1950, p. 105-113.

Defines the term "wear" and indicates different fields where this phenomenon is most often observed. A series of recommendations for protection against wear by choice of materials, design, operating conditions, application of various coatings, etc. (Q9)

577-Q. Photoelastic Analysis for the Purpose of Decreasing the Weight of Beams. (In Italian.) W. Ruff. *Alluminio,* v. 19, no. 2, 1950, p. 122-132.

A study of relationships between weights and stress concentrations. Proposes a new formula for determination of these relationships and verifies it experimentally. Illustrates its uses by application to a trapezoidal beam with two supports. (Q25)

578-Q. Some Problems in Hardness Testing. (In Czech.) **I. The Development and Principles of Hardness Testing. II. The Problem of Shore Hardness.** Ladislav Jenicek and Jaroslav Dobry. *Hutnické Listy,* v. 5, Apr. 1950, p. 163-172.

Part I: The historical development of hardness testing, showing how methods are sometimes accepted because of necessity, but later are shown to be physically invalid. However, these methods often are retained because of tradition. Part II critically discusses the validity of Shore hardness testing. Recommends abandonment of this method. 60 ref. (Q29)

579-Q. Distribution of Deformation Inside a Rolled Strip. (In Russian.) T. M. Golubev. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Apr. 1950, p. 582-590.

Results of investigation of lead specimens indicate the non-uniformity in distribution of residual deformation induced by compression of rolled material. The degree of nonuniformity is dependent on the extent of reduction during rolling, on speed of rolling, and on coefficient of external friction, assuming that other conditions of rolling are constant. 12 ref. (Q24, F22, Pb)

580-Q. Discussion of Paper by G. V. Uzhik "New Criteria for Strength of Metals" at Meeting of Section of Technical Sciences, Academy of Sciences of the USSR; Technical Cohesive Strength as a New Criterion of Strength. (In Russian.) G. V. Uzhik. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Apr. 1950, p. 594-604; 605-628.

First part is a general discussion of report based on several papers previously published by Uzhik. The second part is essentially an extended reply to the points raised in the discussion. The author presents additional theoretical analysis and experimental evidence in support of his proposed strength criteria. Photomicrographs show structures associated with failure of metals. 19 ref. (Q23, ST)

581-Q. Mechanism of Failure of Case Hardened Steel. IV. Relationship

of Case Depth and Bending Properties. V. Relationship of Notch Radius and Bending Properties. (In Japanese.) Hisao Matsumoto. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Dec. 1949, p. 12-17.

Results of an experimental study of the above relationships using a plain carbon steel. Theory. (Q5, J28, CN)

582-Q. The Wear of Cast Iron in Sewing Machines. (In Japanese.) Syuzi Ando and Tadashi Numazu. *Journal of the Casting Institute of Japan,* v. 21, no. 3, 1949, p. 10-18.

The influence of microstructure and surface roughness of parts subject to frictional wear. Little difference was found between pearlitic and ferritic cast iron. (Q9, CI)

583-Q. Fatigue and Service Testing. Howard K. Gandelot. *SAE Journal,* v. 58, Aug. 1950, p. 39-40.

Summarizes proceedings of 1950 SAE Summer Meeting round-table discussion. Fatigue testing of axles for heavy-duty vehicles was emphasized. (Q7)

584-Q. Engine Wear. Harold Myers. *SAE Journal,* v. 58, Aug. 1950, p. 46-49.

Summarizes proceedings of 1950 SAE Summer Meeting round-table discussion. Relative merits of materials in terms of test and service-backed data were argued, including chromium plate for bearings and piston rings, cast iron vs. steel crankshafts and camshafts, tungsten-carbide tappet faces, and Ni-resist piston inserts. Ring and piston failures were described. (Q9, T21, S21)

585-Q. How Design Affects Low-Temperature Properties of Iron & Steels. *SAE Journal,* v. 58, Aug. 1950, p. 58-64. Condensed from "Low Temperature Properties of Ferrous Materials", prepared by SAE Iron & Steel Technical Committee.

Effects of low temperature on mechanical properties, giving details of test methods. Effects of metallurgical factors including heat treatment. (Q general, ST)

586-Q. Ductile Iron—in Light Sections. E. J. Laufer. *Iron Age,* v. 166, Aug. 10, 1950, p. 79-82.

Miscellaneous fittings having thicknesses of $\frac{3}{32}$ to $\frac{1}{4}$ in. are being successfully made from ductile iron. The malleable-iron foundry has been eliminated and all castings are produced in the gray-iron shop. Mechanical tests show excellent properties. Annealing cycle developed for production of maximum ductility. (Q23, J23, T6, CI)

587-Q. Apparatus for Rapid Measurement of Internal Friction. Herbert I. Fusfeld. *Review of Scientific Instruments,* v. 21, July 1950, p. 612-616.

Apparatus which satisfies the conditions of low induced stress amplitude to preclude any plastic flow of the specimen, ability to install specimen within a few minutes after treatment, rapidity of measurement, and accuracy of at least 1%. (Q22)

588-Q. Studies of the Load-Carrying Capacity of Sleeve Bearings. C. M. Allen and K. A. Davis. *Lubrication Engineering,* v. 6, Aug. 1950, p. 161-162, 182.

During a fundamental study of sleeve bearings, tests were run on materials like copper, brass, Constantan, and Invar, as well as on conventional bearing materials, with surprisingly good results. Tests were then run with various imperfections known to exist in service, such as dirty lubricant, rough surfaces, and misalignment. Under these conditions, copper still performed better than either babbitt or copper-lead. Studies are continuing to determine the cause of the unexpected results. (Q9, Cu, Ni, SG-c)

589-Q. Nickel-Alloyed Brass and Bronze Castings. James S. Vanick. *Foundry,* v. 78, Aug. 1950, p. 86-89, 192-193.

Graphs show effects of various percentages of Ni on mechanical properties and grain structure of different brasses and bronzes. Tables show compositions and mechanical properties of common constructional bronzes alloyed with small amounts of Ni. Typical applications. (Q general, M27, Cu)

590-Q. An Unbonded Strain Gauge. S. Baxter and H. A. Vodden. *Journal of Scientific Instruments,* v. 27, July 1950, p. 187-188.

During the development of an apparatus for measuring static stresses in rubber, attempts were made to use a conventional resistance-wire strain gage of the bonded type. Results obtained in tests lasting for several hours or more were unsatisfactory because of drift in gage resistance, probably due to flow of adhesive between the gage and its supports. Unbonded gage gave satisfactory results. Typical calibration curve and nomogram for gage design. (Q25)

591-Q. Tensile Tests at Elevated Temperatures on Forged D.T.D. 364A and R.R. 59. J. McKeown. *Metallurgia,* v. 42, July 1950, p. 92-96.

Data on these Al alloys (compositions given) are tabulated and graphed. (Q27, Al)

592-Q. Adhesion of Solids and the Effect of Surface Films. J. S. McFarlane and D. Tabor. *Proceedings of the Royal Society*, ser. A, v. 202, July 7, 1950, p. 224-243.

Experiments show that, with clean, hard metal surfaces in dry air, adhesion is negligibly small. In moist air appreciable adhesion may be observed, due to the surface tension of a thin film of adsorbed water. Absence of adhesion is due to the released elastic stresses which break the metallic junctions one by one, as the load is removed. With very soft metals, such as lead or indium, marked adhesion is observed in air. This adhesion provides direct evidence for the formation of metallic junctions by cold or pressure welding at the points of contact. If the surfaces are covered with oxide films or lubricant films of appreciable thickness metallic interaction is diminished with a corresponding reduction in adhesion. In general, those materials which are most effective in reducing adhesion are also most effective, as boundary lubricants, in reducing friction. 27 ref. (Q9)

593-Q. Relation Between Friction and Adhesion. J. S. McFarlane and D. Tabor. *Proceedings of the Royal Society*, ser. A, v. 202, July 7, 1950, p. 244-253.

Simultaneous measurements were made of the friction and adhesion of steel sliding on indium in air. Results show that both normal and tangential stresses play a part in deformation of the metallic junctions formed at the interface. The detailed behavior of the junctions during the early stages of the sliding process may be expressed quantitatively in terms of von Mises criterion for plastic deformation under combined normal and tangential stresses, and there is good agreement between theory and experiment. Results emphasize the reality of the cold welding process which occurs at the points of intimate contact when metal surfaces are placed together. The metallic junctions so formed are responsible both for the friction and the adhesion observed. Lubricant films diminish the amount of metallic contact and so lead to a reduction in friction and adhesion. 11 ref. (Q9)

594-Q. High-Temperature Steels in Steam Plant Practice. J. Glen. *Murex Limited Review*, v. 1, no. 6, 1950, p. 106-118.

Compositions and properties of various steels. Effects of compositions and heat treatments are charted vs. mechanical properties. Future needs. 11 ref. (Q general, T25, AY, SG-h)

595-Q. Cases of Brittle Fracture Encountered in Bridge Construction. (In French.) H. Louis. *Revue de la Soudure; Lastijdschrift*, v. 6, no. 2, 1950, p. 96-110.

Critically reviews 14 cases. Fracture location in each case indicates material used, its heat treatment, type of welding electrodes used, and probable causes of failure. (Q26, T26, CN)

596-Q. Nature of Crystals. I. Interatomic Cohesion of Metallic Crystals. (In Russian.) V. Kurbatov. *Zhurnal Obshchei Khimii* (Journal of General Chemistry), v. 20(82), June 1950, p. 945-957.

On the basis of theoretical considerations, a formula is derived for calculation of energy of interatomic cohesion in metallic crystals. Relation between this energy and hardness, electroconductivity, and position of the particular metal in the periodic system is indicated. Shows that interatomic cohesion is a value characterizing the true mechanical properties of metals. (Q general, M26, P10)

597-Q. Yield Strength Versus Extension Under Load. A. E. Nehrenberg. *Metal Progress*, v. 58, Aug. 1950, p. 192.

By plotting the extension under load obtained from automatically recorded stress-strain diagrams against the 0.2% offset yield strength of miscellaneous grades of alloy constructional steels in various conditions of heat treatment, a linear relationship was found. This relationship is particularly useful in determining whether or not a given material conforms to its specifications. Construction of conventional stress-strain diagrams is unnecessary. (Q27)

598-Q. American and Swedish Spring Wire. Alberto Oreffice. *Metal Progress*, v. 58, Aug. 1950, p. 198.

Wires were subjected to chemical analysis and mechanical testing (especially fatigue testing) by an Italian laboratory. Results indicate that at present American wire for valve springs (quality, oil-tempered, carbon-steel wire) is comparable in quality and fatigue properties with the better Swedish wire. (Q7, T7, CN)

599-Q. Tensile Properties of Arc-Cast Molybdenum. *Metal Progress,* v. 58, Aug. 1950, p. 200B.

Data sheet gives tensile properties, hardness, and directional properties at room temperature; and elastic constants and tensile properties at elevated temperatures.
(Q general, Mo)

600-Q. Effect of Cold Work at Low Temperature on Austenitic 18-8. W. O. Binder. *Metal Progress,* v. 58, Aug. 1950, p. 201-207.

An 18-8 valve stem, after 15 years of use in liquid-oxygen manufacture, transformed partially to martensite under the influence of service strains at low temperature (near −300° F.). This prompted a broader investigation of the effect of low-temperature straining on the impact strength of 18-8. Results showed that strains of the magnitude encountered in service can have only a minor effect.
(Q6, N8, SS)

601-Q. Measurement of Strain. M. G. Corson. *Metal Progress,* v. 58, Aug. 1950, p. 232, 234, 236, 238, 240.

Detailed review of each of the 12 articles in "The Measurement of Stress and Strain in Solids", *Institute of Physics* (London), 1948. See item 9-66, 1949. (Q25)

602-Q. Heat Resistant Alloy Combines Exceptional Ductility With Good Creep Strength. *Steel,* v. 127, Aug. 21, 1950, p. 104.

Mechanical properties of new 21% Cr, 9% Ni alloy (ACI Type HF). Some applications.
(Q general, SS, SG-h)

603-Q. Ni-Hard Continues the Battle Against Abrasion. *Nickel Topics,* v. 3. Aug. 1950, p. 6-7.

Miscellaneous applications.
(Q9, Ni)

604-Q. Frictional Properties of Porous Metals Containing Molybdenum Disulphide. F. P. Bowden. *Research,* v. 3, Aug. 1950, p. 383-384.

Results using MoS_2 in sintered Cu and in sintered Mo.
(Q9, Cu, Mo, SG-c)

605-Q. The Sliding Surface. G. I. Finch. *Proceedings of the Physical Society,* v. 63, sec. A, Aug. 1, 1950, p. 785-803.

Previously abstracted from same journal, sec. B, July 1, 1950. See item 572-Q, 1950. (Q9)

606-Q. The Pure Bending of Rectangular Plates. D. G. Ashwell and E. D. Greenwood. *Engineering,* v. 170, July 21, 1950, p. 51-53; July 28, 1950, p. 76-78.

Methods for measuring bending and deformation of rectangular plates and comparing it with that predicted theoretically. Apparatus and typical results. (Q5)

607-Q. (Book) **Plasticity of Crystals With Special Reference to Metals.** E. Schmid and W. Boas. 353 pages. 1950. F. A. Hughes & Co., Ltd., Bath House, Piccadilly, W. 1, London, England.

A translation of the German text. Elasticity, production, and determination of orientation of crystals. Geometry of mechanisms of crystal deformation, plasticity and strength of metal and ionic crystals, theories of crystal plasticity and strength, and properties of polycrystalline materials in relation to the behavior of the single crystal. 703 ref.
(Q23, M26)

608-Q Temper Brittleness in Alloy Steels *Industrial Heating,* v. 17, Aug. 1950, p. 1346. Condensed from "Influence of Composition on Temper Brittleness in Alloy Steels", A. P. Taber, J. F. Thorlin, and J. F. Wallace.

Previously abstracted from *American Society for Metals,* Preprint 22, 1949. See item 3B-201, 1949.
(Q23, J26, AY)

609-Q The Theory of the Discontinuous Yield Point. B. A. Bilby. *Sheet Metal Industries,* v. 27. Aug. 1950, p. 707-718.

Explains the above on the basis of the dislocation theory of plasticity, and its application to yield-point theory and associated phenomena in iron. 48 ref. (Q23, Fe)

610-Q. On the Inhomogeneous Deformation of a Plastic Lamina in a Compression Test. R. Hill. *Philosophical Magazine,* ser. 7, v. 41, Aug. 1950, p. 733-744.

A theory is formulated for calculation of stresses and displacements in thin sheets of arbitrary shape plastically compressed between parallel plates. Experimental data in support of the theory are provided by compression tests on long rectangular strips with both fluid and solid lubricants. A new method is suggested for estimating coefficients of friction applicable to cold working processes. (Q28)

611-Q. A Theoretical Investigation of the Effect of Specimen Size in the Measurement of Hardness. R. Hill. *Philosophical Magazine,* ser. 7, v. 41, Aug. 1950, p. 745-753.

The theory of Hencky and Geiringer for plane plastic strain was applied to calculating minimum dimensions of a specimen for a valid hardness test. Critical widths and thicknesses were determined for

rectangular specimens indented by flat dies and wedges of any angle. The manner in which the specimen deforms during indentation. (Q29)

612-Q. The Effect of Cold-Work on Steel. Section III. An X-Ray Investigation of Internal Strains in Cold-Drawn Steels. J. H. Andrew and P. E. Brooks. **Section IV. Effect of High-Speed Deformation on Steel.** J. H. Andrew and L. Bourne. **Section V. An X-Ray Investigation of Structural Changes in Steel Due to Cold-Working.** D. V. Wilson. **Section VI. Effect of Cold-Work on Hydrogen in Steel.** J. H. Andrew, U. V. Bhat, and H. K. Lloyd. **Section VII. General Discussion.** *Journal of the Iron and Steel Institute,* v. 165, Aug. 1950, p. 369-395.

Includes tables, graphs, micrographs, and diffraction patterns. 44 ref. (Q24, Q25, ST)

613-Q. Electrical Resistance Strain Gauges. R. H. Warring. *Machinery Lloyd* (Overseas Edition), v. 22, Aug. 5, 1950, p. 75-77, 79.

A general discussion. Sensitivity, design, types of application, limitations, preparation of test surface, and technique of using. (Q25)

614-Q. The Yield Point of Mild Steel at Non-Homogeneous and Compound Stress Distributions. (In English.) F. K. G. Odqvist and C. Schaub. *Transactions of the Royal Institute of Technology,* No. 34, 1950, 16 pages.

New theory for the above, the flow limit being associated with the spreading of flow layers through part of the test piece. The theory involves a material constant, which may be determined either from macroscopic measurements or from X-ray measurements of stress distribution preceding spreading of flow layers. 13 ref. (Q23, CN)

615-Q. Influence of Copper, Sulfur, and Oxygen on the Red Brittleness of Steels. (In French.) K. Takadera, N. Matsuura, and T. Kirino. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques,* v. 7, Jan.-Feb. 1950, p. 32-38. Translated and condensed from *Tetsu to Hagare,* v. 29, Feb. 1943, p. 176-182.

Investigated for 0.1-0.2% C. It was found that the red brittleness is caused mostly by oxidation at high temperature. The brittleness varies with carbon content and is influenced to some extent by Cu and S contents. Methods of avoiding this type of brittleness. (Q23, CN)

616-Q. Experimental Research on the Aging of the Material in Metal Bridges. (In Italian.) Angelo Berio. *Metallurgia Italiana,* v. 42, May 1950, p. 175-178.

Results of some static and dynamic control tests on bars taken on some old Italian iron bridges. (Q23, T26, CN)

617-Q. Navy Develops a Wear Testing Machine. George W. Grupp. *Metal Finishing,* v. 48, July 1950, p. 66-67.

Accelerated wear-test machine capable of testing simultaneously 24 different samples of Cr plating. (Q9)

618-Q. Engineering Steels Under Combined Cyclic and Static Stresses. H. J. Gough. *Journal of the American Society of Naval Engineers,* v. 62, Aug. 1950, p. 646-682.

Previously abstracted from *Engineer.* See item 3 B-270, 1949. (Q7, Q1, Q5, ST, CI)

619-Q. Transition Temperature of Ship Plate in Notch-Tensile Tests. E. M. MacCutcheon. *Journal of the American Society of Naval Engineers,* v. 62, Aug. 1950, p. 699-713.

Previously abstracted from *Welding Journal.* See item 250-Q, 1950. (Q23, T22, CN)

620-Q. New Thread Form Reduces Bolt Breakage. Andrew Schwartz, Jr. *Steel,* v. 127, Sept. 4, 1950, p. 86-87, 94.

Endurance limit of bolts, studs, and other threaded fasteners is remarkably increased by a new fatigue resistant thread system designed to minimize "notch effect". The system is diagrammed and fatigue-test data are charted. (Q7, T7)

621-Q. Young's Modulus and Its Temperature Dependence in 36 to 52 Pct Nickel-Iron Alloys. M. E. Fine and W. C. Ellis. *Journal of Metals,* v. 188, Sept. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1120-1125.

Experimental apparatus and procedure. Theory and results. 14 ref. (Q21, Ni, Fe)

622-Q. A Study of Strain Markings in Aluminum. Bani R. Banerjee. *Journal of Metals,* v. 188, Sept. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1126-1128.

Metallographic evidence of strain markings in 99.998% Al, and a study of their crystallography. Incidental observations provide indirect evidence of a close relationship between strain markings and annealing twins, clarify the peculiar behavior of aluminum in its reluctance to form banded annealing twins, and indicate that the type of localized

strain at slip interfaces is responsible for etching effects that render strain markings visible. 11 ref. (Q24, M27, Al)

623-Q. Quantitative Stress-Strain Studies on Zinc Single Crystals in Tension. D. C. Jillson. *Journal of Metals,* v. 188, Sept. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1129-1133.

Highly consistent data were obtained, under one particular set of conditions. Effects of many variables remain to be investigated. An effort to confirm the hypothesis of slip by alternating 210 unit movements was unsuccessful. 19 ref. (Q27, Zn)

624-Q. The Ductility of Cast Molybdenum. R. B. Fischer and J. H. Jackson. *Journal of Metals,* v. 188, Sept. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1149-1153.

Bends tests showed the ductility to be a highly directional property. Heat treatment at 2100° F. improved ductility. Cast texture, cleavage planes, and microstructure. (Q5, M27, J23, Mo)

625-Q. The Textures of Cold-Rolled and Annealed Titanium. Howard T. Clark, Jr. *Journal of Metals,* v. 188, Sept. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1154-1156.

Pole figures showing textures of high-purity Ti. These textures are significantly different from those of other hexagonal close-packed metals in two respects. (Q24, M23, Ti)

626-Q. A Study of the Plastic Behavior of High-Purity Aluminum Single Crystals at Various Temperatures. F. D. Rosi and C. H. Mathewson. *Journal of Metals,* v. 188, Sept. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1159-1167.

Investigated from 77-353° K. Both the critical resolved shear stress and coefficient of shear hardening were found to increase with decrease in temperature. Density of slip bands was also found to increase with decreasing temperature. Some observations were made on appearance of slip bands on etched and unetched electropolished surfaces. 27 ref. (Q2, Q24, Al)

627-Q. The Effect of Sodium Contamination on Magnesium-Lithium Base Alloys. P. D. Frost, J. H. Jackson, A. C. Loonam, and C. H. Lorig. *Journal of Metals,* v. 188, Sept. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1171-1172.

Effects on tensile ductility and the precautions necessary to avoid the contamination. (Q23, E10, Mg)

628-Q. Vibration Fatigue Testing of TV Antennas. Ken Lippert. *Tele-Vision Engineering,* v. 1, Aug. 1950, p. 11, 31.

Mechanical test procedures and equipment. (Q7)

629-Q. Fatigue Strength of Various Types of Butt Welds Connecting Steel Plates. Wilbur M. Wilson, William H. Munse, and I. Sterling Snyder. *Engineering Experiment Station, University of Illinois.* Bulletin Series No. 384. Mar. 1950. 60 pages. (*Bulletin,* v. 47, no. 50.)

Tests on partial-penetration, transverse single-v, and longitudinal single-v butt welds connecting A7 carbon-steel plates. (Q7, K9, CN)

630-Q. Dependence of the Elastic Strain Coefficient of Copper on the Pre-Treatment. W. Kuntze. *National Advisory Committee for Aeronautics,* Technical Memorandum 1287, Aug. 1950, 18 pages.

Variables were pre-straining by stretching in a tensile-testing machine, drawing through a die, aging at room and elevated temperatures, and annealing. Variation of the elastic strain coefficient with test stress. (Q21, Cu)

631-Q. Static and Impact Strengths of Riveted and Spot-Welded Beams of Alclad 14S-T6, Alclad 75S-T6, and Various Tempers of Alclad 24S Aluminum Alloy. H. E. Grieshaber. *National Advisory Committee for Aeronautics,* Technical Note 2157, Aug. 1950, 44 pages.

Test procedure and data. (Q27, Q6, Al)

632-Q. Investigation of Properties of AISI Type 310B Alloy Sheet at High Temperatures. E. E. Reynolds, J. W. Freeman, and A. E. White. *National Advisory Committee for Aeronautics,* Technical Note 2162, Aug. 1950, 37 pages.

Tensile and rupture tests were made to determine whether service at 1700 to 1800° F. would cause further loss of ductility resulting in brittleness at 1300 to 1400° F. Three heats were used to evaluate heat-to-heat reproducibility and relative effects of annealing, cold working, and hot rolling initial treatments. (Q27, Q4, SS, SG-h)

633-Q. Some Experimental Techniques in Stress Analysis. W. M. Murray. *Year Book of the American Iron and Steel Institute,* 1950, p. 383-395; discussion, p. 396.

Use of photoelasticity, stresscoat

technique, and the wire resistance strain gage (SR-4 type). Includes diagrams and photo-elastic patterns. (Q25)

634-Q. The Dependence of the British Standards Reversed Bend Test for Wire on the Testing Machine. J. G. Walford and J. G. Wistreich. *Wire Industry,* v. 17, Aug. 1950, p. 663-665, 667-668, 671.

The two most important types of machines for performing the reversed bend test, frequently specified for testing of wire, were examined. It was found that both the design and the workmanship of the machines have a pronounced effect on the number of bends to fracture. (Q5)

635-Q. Metallurgical Examination of Lead and Lead-Alloy Pressure-Cable Sheaths. A. Latin. *Engineering,* v. 170, Aug. 11, 1950, p. 121-124.

Special mechanical test and metallographic procedures used by a British firm for study of the cause of failures in cable sheaths, which are subjected to internal pressures of about 200 psi. of N_2. Data for pure lead and several of its alloys. Macrographs show typical failures. (Q general, M28, S21, Pb)

636-Q. Damping Capacity. Part III. Effect of the Specimen. Part IV. Correlations and Conclusions. Edward Linacre. *Iron and Steel,* v. 23, Aug. 1950, p. 344-348.

Part III: Effects of composition and grain size, heat treatment, cold work, imperfections, and ferromagnetism. Part IV: Plasticity, strength, and elasticity; general conclusions. 53 ref. (Q8)

637-Q. Cast Iron at Sub-Atmospheric Temperatures. G. N. J. Gilbert. *Foundry Trade Journal,* v. 89, Aug. 10, 1950, p. 149-161; Aug. 17, 1950, p. 179-189; discussion, p. 189.

Previously abstracted from *Institute of British Foundrymen,* Paper No. 964, 1950. See item 565-Q, 1950. (Q23, N8, CI)

638-Q. The Theoretical Background and Interpretation of the Schnadt Impact-Test. (In English.) J. H. Palm. *Metalen,* v. 4, May 1950, p. 177-184; June 1950, p. 213-217; July 1950, p. 231-236.

Because of the growing interest in the above test on the part, not only of design engineers, but of those interested in the cold brittleness problem, a special meeting entirely devoted to the test and its practical significance was held in Holland on Feb. 21, 1950. Part I attempts to give a clear picture of Schnadt's ideas. Part II describes the system and test method themselves. Part III consists of a critical evaluation of the system. 17 ref. (Q6)

639-Q. Microsclerometric Analysis of the Temper Brittleness of Steel With Low Nickel and Chromium Contents. (In French.) Helmut Bückle and Pierre-A. Jacquet. *Comptes Rendus* (France), v. 230, June 19, 1950, p. 2198-2200.

Studied for low-alloy steel (0.30% C, 3.25% Ni, 1.65% Cr) using the microhardness tester of Hanemann and Zeiss. It was found that the Meyer exponent is less than 2 for this steel when it is tough and greater than 2 when brittle. Indicates that temper brittleness results from reversible transformation of carbides which induces a state of stress. (Q23, Q29, N8, AY)

640-Q. Comparative Tests on Steel and Light-Alloy Beams Supporting Hatch Covers. (In French.) *Revue de l'Aluminium,* v. 27, June 1950, p. 226-227.

Results of comparative tests by British engineers showing that the Al alloy (A-SG) beam weighs 56% less but resists 30% more load without permanent deformation. (Q28, T26, Al)

641-Q. Basis of the Mathematical Theory of Plasticity and Its Investigation. (In German.) Fritz Stussi. *Zeitschrift für angewandte Mathematik und Physik,* v. 1, no. 4, 1950, p. 254-267.

Mathematical theory and results of experimental work on thin-walled hollow cylinders, designed to determine the correctness of the current theory of plasticity. It was found that the coefficient of lateral expansion for the plastic deformation components is not two; therefore the hypothesis of constant volume during plastic deformation is incompatible with the behavior of the material examined. Also the behavior of the material was not isotropic or quasi-isotropic, but decidedly anisotropic. Thus, the second hypothesis of the theory of plasticity is also not borne out by the facts. (Q23)

642-Q. Laws of the Creep of Metals. (In Russian.) V. I. Likhtman. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 72, June 21, 1950, p. 1079-1082.

Creep was theoretically investigated at room, high, and low temperatures under different applied loads. Formulas are proposed which describe the constancy of internal cohesion of metal during creep. An

equation for determination of the minimum rate of creep is derived and interpreted for different values of the variables. (Q3)

643-Q. The Fatigue Limit of Chrome Plated Aircraft Steels. *Metal Finishing*, v. 47, Nov. 1949, p. 60-61, 98. Condensed from "Effect of Chromium Plating on the Endurance Limit of Steels Used in Aircraft," Hugh L. Logan.

Previously abstracted from *Journal of Research of the National Bureau of Standards.* See item 3B-219. (Q9, Cr, AY)

644-Q. Mathematical Analysis of Springback Angles for Aluminum Sheets. Y. C. Lee. *Tool Engineer,* v. 25, Sept. 1950, p. 21-23.

Analysis is based on experimental results for clad 24S-T and 24S-O. Springback is tabulated and charted vs. radius of the steel-block form used, vs. thickness, and for various pressures on the form block. (Q21, Al)

645-Q. Why and How Metals Break. *Welding Journal,* v. 29, Sept. 1950, p. 768-769. Reprinted from *Welding Arcs,* June 1949.

New theories. Investigations show that fracture of metals begins with extremely small cracks, nuclei which grow into a large split when enough tension is applied. (Q26)

646-Q. The Influence of Biaxiality on Notch Brittleness. D. Rosenthal and W. D. Mitchell. *Welding Journal,* v. 29, Sept. 1950, p. 409s-421s.

Notch sensitivity of mild steel flat specimens subjected to tension and bending was investigated by means of the ductility transition temperature. Effects of thickness of specimens, and depth and radius of the notch. The last two quantities were varied in such a way as to keep constant the stress-concentration factor at the bottom of the notch. 17 ref. (Q23, CN)

647-Q. Interpretive Report, Fabrication Division, Pressure Vessel Research Committee. H. C. Boardman. *Welding Journal,* v. 29, Sept. 1950, p. 422s-432s.

Engineering report on contemporary scientific research in the fabrication of pressure vessels and closely allied fields. Deals mainly with work at Lehigh University covering choice of transition-temperature test specimen, effect of plastic strain and heat treatment, and effect of plastic strain, followed by welding and subsequent heat treatment, on transition temperature. (Q23, K general, T26, ST)

648-Q. Comparative Tests of Different Types of Notch Impact Specimens. *Welding Journal,* v. 29, Sept. 1950, p. 466s. Translated and condensed from *Lastechniek,* v. 16, May 1950, p. 79-81.

Transition temperature of a killed basic openhearth steel was measured with three types of specimen, each 0.394 in. square, 2 3/16 in. long. Type 1 had a notch 0.20 in. deep, 0.04 in. radius, and is the specimen recommended by the International Standards Assn. Type 2 had a notch 0.12 in. deep, 0.04 in. radius and is the standard German DVMR type. In Type 3, notch depth was 0.08 in., and notch radius 0.04 in. This is the Mesnager specimen used in Belgium. For types 1 and 2 the transition temperature lay between −20 and −40° C. The Mesnager specimen, on the other hand, indicated a transition temperature below −60° C. (Q6, ST)

649-Q. The Micro-Mechanism of Fracture in the Tension-Impact Test. W. H. Bruckner. *Welding Journal,* v. 29, Sept. 1950, p. 467s-476s.

Results of metallographic studies made on a number of specimens of rimmed, semi-killed, and fully killed steels, and on an Armco iron. The samples were partially fractured, or loaded just to fracture, then sectioned and examined. (Q27, ST, Fe)

650-Q. Room Temperature Tensile Tests as an Index of Transition Temperature of Steel Plates. Sadun S. Tör, Robert D. Stout, and Bruce G. Johnston. *Welding Journal,* v. 29, Sept. 1950, p. 477s-483s.

Possibility of using reduction-of-area results obtained from room-temperature, round-bar tensile tests to predict transition temperatures of pressure-vessel steels. Extensive experimental data support this suggestion. (Q27, ST)

651-Q. Distribution of Locked-In Stresses in a Large Welded-Steel Box Girder. John Vasta. *Welding Journal,* v. 29, Sept. 1950, p. 484s-493s.

A large welded box girder, made of relatively thick plates and embodying a high degree of constraint, was fabricated and then trepanned for the purpose of determining stress distribution. Stresses were obtained by the relaxation method, and changes in strain were measured by means of SR-4 gages. Strain-gage drift and other factors affect probable accuracy of the data. The limitations of a quasi-destructive method as a tool for determining locked-in stresses. (Q25, CN)

652-Q. Impact Tests of Welded Austenitic Stainless Steels. V. N. Krivobok and R. D. Thomas, Jr. *Welding Journal,* v. 29, Sept. 1950, p. 493s-495s.

Data were obtained through the combined efforts of the research laboratories of International Nickel Co. and Arcos Corp. AISI types 301, 302, 304, 308, 310, 316, 317, 318, and 347 were tested at room temperature, −105, and −320° F. (Q6, SS)

653-Q. Stress Analysis With Brittle Lacquer. B. Salmon. *Aircraft Engineering,* v. 22, Sept. 1950, 256-263. Translated from *Technique et Science Aeronautiques,* No. 6, 1949, p. 343-362.

A method for experimental evaluation of loads developed in components of complex shape. (Q25)

654-Q. The Flow and Fracture of a Brittle Material. L. F. Coffin, Jr. *Journal of Applied Mechanics,* v. 17 *(Transactions of the American Society of Mechanical Engineers,* v. 72), Sept. 1950, p. 233-248.

Mathematical analysis of the mechanism of flow and fracture of gray cast iron is followed by a description of a combined stress-testing program in which thin-walled cast-iron tubes were subjected to two-dimensional states of combined stress covering the complete two-dimensional field. Stress-strain curves and permanent volume change on tension and compression, also plastic volume change, are charted. 19 ref. (Q23, Q26, CI)

655-Q. Approximate Solutions of Problems of Plane Plastic Flow. P. G. Hodge, Jr. *Journal of Applied Mechanics,* v. 17 *(Transactions of the American Society of Mechanical Engineers,* v. 72), Sept. 1950, p. 257-264.

A method of approximating stress and velocity fields in these problems. A general procedure for finding the deformed pattern of an originally square grid is devised and applied to two examples. Results are compared with known continuous solutions and with experiments. 10 ref. (Q23)

656-Q. Crushing of Aluminum Tubes Under Hydrostatic and Localized Pressure. E. Creutz. *Journal of Applied Mechanics,* v. 17 *(Transactions of the American Society of Mechanical Engineers,* v. 72), Sept. 1950, p. 324-326.

Equations derived by Sturm and Timoshenko have been found to fit experimental data on steel tubes, provided the length is several times the diameter, and the ratio of diameter to wall thickness exceeds about 30. An experimental study of Al tubes was conducted to determine whether the equations would apply. No satisfactory correlation was found to exist, but a simple equation was derived which is well within the reproducibility of the test results. (Q28, Al)

657-Q. Creep of Annealed High-Purity Copper. *Technical News Bulletin* (National Bureau of Standards), v. 34, Sept. 1950, p. 130-131. Based on paper by W. D. Jenkins and T. G. Digges, *Journal of Research of the National Bureau of Standards,* v. 45, Aug. 1950.

Effects on creep behavior of stress, temperature, mechanical and thermal history, rate of loading, and sudden changes in both stress and temperature. Tests were made at 110, 250, and 300° F. Metallographic examination, hardness measurements, and tension tests were conducted at room temperature. (Q3, Cu)

658-Q. Adhesion of Indium Under Static and Dynamic Loading. A. W. Crook and W. Hirst. *Research,* v. 3, Sept. 1950, p. 432-433.

Mechanical behavior of indium during impact was studied by measuring piezoelectrically the force of impact as a function of time. (Q6, In)

659-Q. Creep Deformation of Metals. L. Rotherham and L. W. Larke. *Research,* v. 3, Sept. 1950, p. 434-436.

Some observations of grain growth in a 0.5% Ag aluminum alloy in which the effect on creep rate was not very large. Observations suggest that the breakdown to subgrains is not the primary cause of creep, but a secondary effect resulting from creep. (Q3, Al)

660-Q. Friction. F. P. Bowden. *Nature,* v. 166, Aug. 26, 1950, p. 330-334.

Fundamental principles in general. Area of contact between solids; friction and adhesion; general effect of surface films; surface temperature of sliding solids; and frictional properties of plastics. (Q9)

661-Q. The Meyer Law for Hardness Tests. Emilio Jimeno and Jose Terraza. *Nature,* v. 166, Aug. 26, 1950, p. 359.

Mathematical analysis. Table shows that calculated values are consistent with experimental ones for Cu, 70-30 brass, commercial Al, and soft steel. (Q29, Al, Cu, CN)

662-Q. Creep Due to Fluctuating Stresses at Elevated Temperatures. H. J. Tapsell, P. G. Forrest, and G. R. Tremain. *Engineering,* v. 170, Aug. 25, 1950, p. 189-191. (A condensation.)

Results of experimental study for the heat resisting materials Rex

78 and Nimonic 80, and for the Al alloy RR59, also for 0.26% C steel. Experimental and theoretical data are compared. (Q3, Al, CN, Ni, SG-h)

663-Q. The Electrical Wire Resistance Strain Gauge and Its Applications. F. C. Widdis. *Machinery* (London), v. 77, Aug. 31, 1950, p. 259-264. (Q25)

664-Q. The Flow of Zinc Under Constant Stress. A. H. Cottrell and V. Aytekin. *Journal of the Institute of Metals,* v. 77, July 1950, p. 389-422.

Part A: A general study of flow of single crystals of pure Zn, under constant shear stress on the glide planes, and of polycrystalline specimens, under constant tensile stress. Part B: Nature of steady-state flow in single crystals is examined from the point of view of the recovery theory of creep. Application of the theory to the softening of strain-hardened crystals during annealing experiments leads to the conclusion that yield strength should decrease according to a logarithmic time relation. 33 ref. (Q24, Q3, Zn)

665-Q. Mechanism of Primary Creep in Metals. W. A. Wood and R. F. Scrutton. *Journal of the Institute of Metals,* v. 77, July 1950, p. 423-434.

Studied experimentally, using 99.98% Al. Micrographs and X-ray diffraction patterns illustrate results obtained, which are analyzed theoretically. (Q3, Q24, Al)

666-Q. The Mechanism of Creep as Revealed by X-Ray Methods. G. B. Greenough and Edna M. Smith. *Journal of the Institute of Metals,* v. 77, July 1950, p. 435-443.

A hypothesis is proposed to explain in terms of dislocation theory the recent observations of Wilms and Wood and of Wood and Rachinger in relation to the mechanism of deformation of metals. Some new X-ray observations on Al which support the hypothesis. (Q3, Q24, Al)

667-Q. Some X-Ray Observations on the Nature of Creep Deformation in Polycrystalline Aluminium. E. A. Calnan and B. D. Burns. *Journal of the Institute of Metals,* v. 77, July 1950, p. 445-455.

Back-reflection Laue patterns were taken from the same series of locations on a large-grained Al testpiece after successive amounts of creep deformation at 250° C. From analysis of the asterism and movement of the reflection spots relative to the stress axis, it appears that creep deformation up to about 3% extension in 170 hr. is associated with slip processes. Later stages are characterized by presence of numerous fine units or cells formed from the previously distorted material. 12 ref. (Q3, Q24, Al)

668-Q. Mechanical Properties of Materials. C. W. MacGregor. "Handbook of Experimental Stress Analysis", John Wiley & Sons, New York, 1950, p. 1-27.

Properties which are of interest to the stress analyst. Defines basic concepts. Stress-strain diagrams and their advantages. 31 ref. (Q general, Q25)

669-Q. Testing Machines. Joseph Marin. "Handbook of Experimental Stress Analysis", John Wiley & Sons, New York, 1950, p. 28-71.

Methods of load application and load measurement. Static, dynamic, and special testing machines. 64 ref. (Q general)

670-Q. Mechanical Gages and Extensometers. L. H. Donnell and W. T. Savage. "Handbook of Experimental Stress Analysis", John Wiley & Sons, New York, 1950, p. 72-117.

Problems arising in the design of mechanical instruments and mechanical parts of optical and electric instruments used to measure strains and small motions. 25 ref. (Q25)

671-Q. Optical Methods of Strain Measurement. John L. Maulbetsch. "Handbook of Experimental Stress Analysis", John Wiley & Sons, New York, 1950, p. 118-159.

Definitions and elements of optical theory necessary for understanding functioning of optical systems. Elements of instruments from the specifications view. Instruments and systems. 41 ref. (Q25)

672-Q. Electrical-Resistance Gages and Circuit Theory. C. O. Dohrenwend and W. R. Mehaffey. "Handbook of Experimental Stress Analysis", John Wiley & Sons, New York, 1950, p. 160-237.

Types of gages, electric circuits used with them, principles of electronics, and their application to the gaging problem. Includes circuit diagrams and graphs. 26 ref. (Q25)

673-Q. Electric-Inductance Gages. B. F. Langer. "Handbook of Experimental Stress Analysis", John Wiley & Sons, New York, 1950, p. 238-272.

General types, fundamental relationships, types of pickup, structural details, magnetic forces, typical circuits, theory of the a.c. bridge, auxiliary equipment, applications, and limitations. 20 ref. (Q25)

674-Q. Electric-Capacitance Gages. B. C. Carter, J. R. Forshaw, and J. F. Shannon. "Handbook of Experimental Stress Analysis", John Wiley & Sons, New York, 1950, p. 273-300.

Varying gap and varying area pickups, amplifier circuits for variable capacitance gages, and applications to strain measurement. Developments made by the authors and other work on capacitance measurement. 10 ref. (Q25)

675-Q. Motion Measurements. J. Ormondroyd, R. B. Allnutt, F. Mintz, and R. D. Specht. "Handbook of Experimental Stress Analysis", John Wiley & Sons, New York, 1950, p. 301-389.

Steady-state and transient motion; stresses due to each, measuring instruments, and interpretation of data. 61 ref. (Q25)

676-Q. Strain Rosettes. J. H. Meier. "Handbook of Experimental Stress Analysis", John Wiley & Sons, New York, 1950, p. 390-437.

Definition of strain rosettes and their purpose. Stresses and strains at a point, measurements, sensitivity of gages, computations, observation errors, and graphical representation. 65 ref. (Q25)

677-Q. Working Stresses. C. Richard Soderberg. "Handbook of Experimental Stress Analysis", John Wiley & Sons, New York, 1950, p. 438-458.

The phenomenon of failure; strength properties of materials; yielding of ductile metals; fractures; working stress; and proposed rules for working stresses. 13 ref. (Q23, Q26)

678-Q. Residual Stresses. Oscar J. Horger. "Handbook of Experimental Stress Analysis", John Wiley & Sons, New York, 1950, p. 459-578.

Use of thermal and transformation stresses to improve fatigue resistance. Methods of measurement. Relation to machining operations, parts (tubes, gears, rivets, beams, etc.), heat treatment, cracking, and flaking. Involves carbon and alloy steels and aluminum. 198 ref. (Q25, Al, AY, CN)

679-Q. Interpretation of Service Fractures. R. E. Peterson. "Handbook of Experimental Stress Analysis", John Wiley & Sons, New York, 1950, p. 593-635.

Bending-fatigue, torsion-fatigue, static or constant-load, and impact fractures. Special cases of fatigue failure. 77 ref. (Q7, S21)

680—Q. Brittle Models and Brittle Coatings. M. Hetenyi. "Handbook of Experimental Stress Analysis", John Wiley & Sons, New York, 1950, p. 636-662.

Characteristics of brittle fractures; plaster models; statistical theory of strength and stress crazing of synthetic resins. Covers oxide and resinous coatings and stresscoat. 57 ref. (Q25)

681-Q. Structural Model Analysis. J. B. Wilbur and C. H. Norris. "Handbook of Experimental Stress Analysis", John Wiley & Sons, New York, 1950, p. 663-699.

Application and standard methods for stress analysis. Design of models and properties of model materials, 16 ref. (Q25)

682-Q. Analogies. Raymond D. Mindlin and Mario G. Salvadori. "Handbook of Experimental Stress Analysis", John Wiley & Sons, New York, 1950, p. 700-827.

A mathematical treatment including sections on torsion and flexure of cylindrical bars; electrical analogies for the torsion of bars of varying circular section; two-dimensional stress and strain; electric-network analogue of the elastic field; and electric-network analogues of framed structures. 67 ref. (Q general, Q25)

683-Q. Photoelasticity. I. Fundamentals and Two-Dimensional Applications. T. J. Dolan and W. M. Murray. **II. Three-Dimensional Photoelasticity.** D. C. Drucker. "Handbook of Experimental Stress Analysis", John Wiley & Sons, New York, 1950, p. 828-976.

Equipment and procedure applied to stress analysis. 177 ref. (Q25)

684-Q. X-Ray Analysis. Charles S. Barrett. "Handbook of Experimental Stress Analysis", John Wiley & Sons, New York, 1950, p. 977-1012.

Detection of internal flaws by radiography and determination of stresses by X-ray diffraction. 67 ref. (Q25, S13, M22)

685-Q. Fundamentals of the Theory of Elasticity. S. P. Timoshenko. "Handbook of Experimental Stress Analysis", John Wiley & Sons, New York, 1950, p. 1013-1034.

Plane and three-dimensional stress and strain. (Q21)

686-Q. Dimensional Analysis. J. N. Goodier. "Handbook of Experimental Stress Analysis", John Wiley & Sons, New York, 1950, p. 1035-1045.

Methods and applications to elastic, linear, and composite structures. Relaxation of similarity conditions; gravity and surface loads; prescribed displacements; curved stress-strain relations; buckling; and vibration due to aerodynamic forces. (Q25)

687-Q. The Precision of Measurements. M. Hetenyi. "Handbook of Experimental Stress Analysis", John

Wiley & Sons, New York, 1950, p. 1046-1060.

A general statistical discussion. (Q25, S12)

688-Q. (Book) Handbook of Experimental Stress Analysis. M. Hetenyi, editor. 1077 pages. 1950. John Wiley & Sons, 440 Fourth Ave., New York 16. $15.00.

Eighteen chapters and three appendixes by different authors, covering experimental methods of determining mechanical stress and related topics (residual stresses, interpretation of service fractures, etc.). (Individual papers are separately abstracted.) (Q25)

689-Q. (Book) The Inelastic Behavior of Engineering Materials and Structures. Alfred M. Freudenthal. 587 pages. 1950. John Wiley & Sons, 440 Fourth Ave., New York 16. $7.50.

Basic concepts and definitions. Develops physical and engineering framework of the theory of inelasticity (theory of general deformational behavior). Problems of the mechanics of the inelastic continuum, design of engineering structures, and mechanical testing. Chapter bibliographies. (Q general, Q23)

690-Q. Effect of Shot Peening on the Brittle Transition Temperature. Nicholas Grossman. *Metal Progress,* v. 58, Sept. 1950, p. 352-354.

Shows that, for 1020 steel, shot peening markedly reduced the above temperature, as measured by slow-bend tests of notched specimens. (Q23, G23, CN)

691-Q. Investigation of Bearing Materials Under Various Degrees of Lubrication in the Low-Speed Range. Louis A. Nowell, Jr. *ASTM Bulletin,* Sept. 1950, p. 47-53.

First progress report is concerned with steps taken to adapt an Amsler wear testing machine to bearing lubrication tests. Experiments were conducted on 30° and 60°, steel-backed, Navy Grade 2, tin-base babbitt bearings operating on a 2-in. diam. journal. Navy 2190-T oil was used. The studies covered speeds of 25-250 r.p.m. and loads of 40-900 psi. Measurements were made of friction and of oil and bearing temperatures. Observations were obtained on electrical properties of the oil film. Apparatus data. (Q9, Sn, SG-c)

692-Q. Effect of Hydrogen on Mechanical Properties of Some Aluminum Alloys. W. R. Opie and N. J. Grant. *Foundry,* v. 78, Oct. 1950, p. 104-109, 209-210.

Experiments indicate possibility of studying H_2 solubility in a system containing water vapor. While there is no evidence that dissolved H_2 embrittles Al, H_2 which precipitates interdendritically when Al solidifies markedly weakens the metal. Amounts of hydrogen less than necessary to produce some pinhole porosity will yield microscopic cavities which decrease greatly the tensile strength and elongation of a 5% Si Al alloy. 12 ref. (Q23, N12, Al)

693-Q. Heat Resisting Steels; Influence of Alloy Additions. G. T. Colegate. *Metal Treatment and Drop Forging,* v. 17, Summer 1950, p. 93-101, 109.

Various types of steels and effects of small additions of other elements such as Si, Cb, Co, and Mo, to each type. Oxidation resistance, creep, tensile strength, yield strength, elongation, area reduction, proportional limit, and Brinell hardness are tabulated and charted. (Q general, R2, SS)

694-Q. Vibration Testing Equipment for Aeronautical Research. *Engineering,* v. 170, Sept. 1, 1950, p. 203-204.

Equipment made by a British firm. (Q9)

695-Q. An Optical Method for Studying the Deformation of Mild Steel. E. O. Hall. *Proceedings of the Physical Society,* v. 63, sec. B, Sept. 1, 1950, p. 724-726.

A new "optical strain gage" method, which has been used in studying the properties of strain-aged materials. When a normal specimen of mild steel is strained, the stress-strain curve is very jagged, because of the generation of a complex system of Lüders' bands. This difficulty can be avoided by use of thin wire specimens. However, after long aging times at 50-200° C., a secondary Lüders' band may appear, having propagation stress up to 40% more than the primary one. In order to study development of the secondary band, a technique was used similar to that described by Orowan (1949) for study of jerky extension of Zn crystals. (Q25, CN)

696-Q. Slip Lines. (In German.) Doris Kuhlmann. *Zeitschrift für Metallkunde,* v. 41, May 1950, p. 129-140.

A comprehensive review of experimental work on slip lines and bands. 97 ref. (Q24)

697-Q. High-Temperature Tensile Testing of Aluminum Alloys. (In German.) Hugo Vosskühler. *Zeitschrift für Metallkunde,* v. 41, May 1950, p. 144-151.

Reports results of tests made on a series of malleable and cast Al-

alloys to determine their tensile strengths, 0.2 and 0.02% yield strengths, elongations, and area contractions between room temperature and 300° C. Results are supplemented by published data and thus expanded to −200° C. Includes graphs. (Q, A1)

698-Q. Stresses on Machine Parts. (In German.) P. Richarz. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 16, June 1950, p. 172-175.

Factors affecting the strength of cylindrical shafts. (Q23)

699-Q. Anchoring and Cold-Tensile Stresses in Structural Steels. (In German.) C. Forssell. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 16, July 1950, p. 200-213.

Experimental facts concerning the strength of structural steels and methods of anchoring them to concrete—considering safety as well as economic factors. Diagrams, graphs, and tables. (Q23, T26, CN)

700-Q. Fatigue Strength of ST37 Steel. (In German.) Erich Gerold and Karl Trachte. *Archiv für das Eisenhüttenwesen,* v. 21, May-June 1950, p. 175-179.

Correlation between the practically undeformed fatigue fracture resulting from a slowly increasing tensile-fatigue load and the highly deformed fracture associated with the tensile test; also effect of number of fatigue-test cycles on elongation and area-contraction of notched and unnotched flat and round test bars of a low-carbon steel. (Q7, CN)

701-Q. Rapid Method for Determining Fatigue Strength. (In German.) Erich Gerold and Alfred Karius. *Archiv für das Eisenhüttenwesen,* v. 21, May-June 1950, p. 191-195.

New method which measures change in natural frequency and damping power of the metal under alternating stresses increased in steps. Tests were made on seven carbon and six alloy steels, also three nonferrous metals. Results show that the test is only partly valid for tempered Cr steels and nonferrous alloys, and wholly useless for notched specimens. (Q7)

702-Q. Effect of Low Cold Rolling Stresses on the Mechanical Properties of Thin Sheet Metal. (In German.) Fritz Eisenkolb. *Archiv für das Eisenhüttenwesen,* v. 21, May-June 1950, p. 197-201.

Variables included effects of heat treatment, form of test bar, chemical composition (four carbon-steel analyses), and artificial aging. Includes explanation of effects based on structural considerations. 14 ref. (Q general, F23, CN)

703-Q. Testing Steels for Their Tendency to Creep-Stress Embrittlement With U-Shaped Specimens and by Slow Tensile Tests. (In German.) Wilhelm Ruttmann, Gerhard Bandel, and Rudolf Schinn. *Archiv für das Eisenhüttenwesen,* v. 21, July-Aug. 1950, p. 225-233.

Tests were made with notched and unnotched ferritic and austenitic steel bars at 450-700° C. Comparison of results with those from long-time creep tests (3000 and 10,000 hours) shows that the described method permits relatively rapid determination of the tendency of heat resistant steels to creep-stress embrittlement. 14 ref.
(Q3, CN, AY, SG-h)

704-Q. Fatigue Strength of Helical Springs Made by Different Firms. (In German.) Anton Pomp and Max Hempel. *Archiv für das Eisenhüttenwesen,* v. 21, July-Aug. 1950, p. 243-262.

Springs (three alloy and one carbon steel) were tested by two different laboratories to determine effect of surface condition and production method on fatigue strengths. Results indicate no difference in strength properties between the alloyed and unalloyed springs, also no difference between the springs annealed before and after winding. Shot-peened springs were stronger by 32-36%. 26 ref.
(Q7, G23, T7, CN, AY)

705-Q. Fatigue Strength of Helical Springs at Elevated Temperature. (In German.) Anton Pomp and Max Hempel. *Archiv für das Eisenhüttenwesen,* v. 21, July-Aug. 1950, p. 263-272.

Tests on springs (three alloy and one carbon steel) showed that the fatigue resistance of shot-peened springs is considerably less at 250 than at 20° C. However, the fatigue resistance of the unpeened alloy steel springs was slightly greater at 250 than at 20° C.
(Q7, G23, T7, CN, AY)

706-Q. The Impact Strength of Bessemer Steel Castings. (In German.) E. Piwowarsky and W. Wüllenweber. *Neue Giesserei,* v. 37 (new ser., v. 3), July 27, 1950, p. 293-296.

Methods for improving impact strength. 10 ref. (Q6, CI)

707-Q. Effects of Various Factors on the Appearance of Shear Cracks in Al-Cu-Mg Alloy Rivets. (In German.) W. Mannchen and H. Bothmann. *Metall,* v. 4, July 1950, p. 278-281.

Experiments made with two alloys to determine effects of Si, Fe, and

Mn contents, length of homogenizing treatment, degree of area reduction in final drawing, and aging on cracking tendency of rivets. (Q2, T7, Al)

708-Q. Development of Standards for Hardness Testing Recording Devices. (In German.) P. Melchior. *Metall,* v. 4, Aug. 1950, p. 321-329.

Technical aspects of hardness testing such as clamping of the test specimen, number of readings per specimen, number of specimens to be tested, odd-shaped specimens, and possible sources of error. Numerous examples. (Q29)

709-Q. An Experimental Investigation of Plastic Stress-Strain Relations. J. L. M. Morrison and W. M. Shepherd. *Institution of Mechanical Engineers, Proceedings* (Applied Mechanics Div.), v. 163, W.E.P. No. 55, 1950, p. 1-9; discussion, p. 10-17.

Tests on a low-alloy steel and on an Al alloy, made in order to discriminate between and evaluate the merits of the "incremental" and "total" plastic-strain theories in the region where elastic and plastic strains are of comparable magnitude. The tests appear to establish that for these two materials the "total" type of theory is incorrect, and in some instances may lead to large errors. The experimental results give strong support to the "incremental" theory. (Q24, AY, Al)

710-Q. The Use of Mild Steel for Service at Sub-Zero Temperatures. F. H. Keating and E. V. Mathias. *Institution of Mechanical Engineers, Proceedings* (Applied Mechanics Div.), v. 163, W.E.P. No. 55, 1950, p. 27-36; discussion, p. 36-40.

Investigation made to determine the limiting sub-zero temperature at which mild steel may safely be used, in relation to notch brittleness. Effects of variation in notch dimensions on impact values; effects on impact values of the surface cold-working resulting from grinding and machining; and beneficial effects of stress-relieving. Practical experiments on small mild-steel welded vessels, the vessels being tested to destruction at −80° C. Results indicate that mild-steel welded equipment may safely be used at temperatures down to −50° C. Failures of pressure vessels. 34 ref. (Q23, Q6, CN)

711-Q. High-Pressure Vessels in the Chemical Industry. J. J. Grænville. *Institution of Mechanical Engineers, Proceedings,* v. 162, No. 2, 1950, p.. 199-204.

Mechanical requirements for high-pressure vessels, and progressive changes in their construction during the last 30 years. Stress distributions in the cylinder wall, suitable closure mechanisms, effects of temperature, chemical and physical attacks, and provisions for stirring, heating, and cooling, as well as control mechanisms and safety precautions. (Q general, T26, ST)

712-Q. Study of Properties of Aluminum Bronzes. (In French.) Raymond de Fleury. *Fonderie,* July 1950, p. 2122.

Triangular diagrams show resistance to rupture, elastic limit, and percent elongation of alloy containing 0-20% Ni and 0-10% Al. Information supplements that provided in an article by J. S. Vanick (Feb. issue). (Q general, Cu)

713-Q. Contribution to the Study of Plastic Deformation of Iron and Soft Steels. (In French.) Ch. Boulanger. *Revue de Metallurgie,* v. 47, July 1950, p. 547-556; discussion, p. 556-557.

Investigated on the basis of tensile-test data obtained at different temperatures using small wire specimens. By this means, very slight changes in metallic structure are revealed. In the case of iron, because of very thorough purification, it was possible to eliminate all behavior characteristics of steels and then to make this behavior reappear by cementation (using nitrogen, carbon, or oxygen). Results and the mechanism of plastic deformation. 13 ref. (Q24, J28, Fe, CN)

714-Q. Application of Photoelastic Methods to Study of the Working of Metals. (In Russian.) S. I. Gubkin and S. I. Dobrovol'skii. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, July 1, 1950, p. 91-93.

Color photographs illustrate photoelastic stress patterns obtained with a new transparent plastic (composition not indicated). (Q25)

715-Q. Chart for Calculation of Mechanical Properties of Aluminum-Alloy High-Voltage Power Lines. (In French.) Auguste Dalmasso. *Revue de l'Aluminium,* v. 27, July-Aug. 1950, p. 262-265.

Chart facilitates design of these lines. Such features as maximum span, sag, tension can readily be determined. (Q general, T1, Al)

716-Q. Correlation of the Deep-Drawing Qualities of a Material and Its Tensile Test Results. C. Arbel. *Engineers' Digest,* v. 11, Sept. 1950, p. 304-307. Translated and condensed from *Revue de Métallurgie,* v. 47, May 1950, p. 388-394.

Previously abstracted from origi-

nal under title: "Research on the Relation Between Formability (Stamping Properties) of Metals and Their Tensile Strength". See item 490-Q, 1950.
(Q23, Q27, Al, SS)

717-Q. Impact, Tensile and Hardness Tests on Some Ferrous Alloys and Weld Deposits at Low Temperatures. T. Fukuroi, G. Monna, N. Ishii, and Y. Okamatsu. *Engineers' Digest,* v. 11, Sept. 1950, p. 315-316. Translated and condensed from *Science Reports of the Research Institutes, Tohoku University,* Ser. A, v. 1, No. 2, p. 101-105.

Data obtained for mild steel, low-carbon steel, Cr-Mo steel, Cr-Mn austenitic steels, low-alloy and high-alloy steel welding rods at 0, −50, −78.5, −100, −120, −150, and −195.5° C. (Q27, Q29, Q6, AY, CN)

718-Q. Creep-Time Law for Zinc Crystals. E. P. T. Tyndall. *Journal of Applied Physics,* v. 21, Sept. 1950, p. 939.

Creep of suitably oriented zinc single crystals was found to follow a simple empirical law: $S=At^M$, in which S is strain (nonelastic) occurring in time t after load application and A and M are constants. (Q3, Zn)

719-Q. Fracture Modes in High Purity Metals. T. J. Agnor and M. E. Shank. *Journal of Applied Physics,* v. 21, Sept. 1950, p. 939-940.

Results of a study of the behavior of high-purity Zn and Fe. Evidence supports the belief that the mechanism of transition temperature in metals is entirely unrelated to aging and inhomogeneous yielding phenomena. (Q26, Zn, Fe)

720-Q. On the Negligible Changes Produced in the Stress-Strain Curve by Immersion of a Copper Single Crystal in Mercury. J. B. Wachtman, Jr. *Journal of Applied Physics,* v. 21, Sept. 1950, p. 943-944.

Frank suggests that immersing a single crystal in a liquid of higher density will suppress reflections of dislocations. If reflection of dislocations plays an appreciable role as compared with internal processes in formation of slip bands, the stress-strain curve should be changed. Data show that such changes are negligible. (Q24, Cu)

721-Q. Properties of Metals at Elevated Temperatures. G. V. Smith. *Mechanical Engineering,* v. 72, Oct. 1950, p. 799-804.

Properties are classified in the broad categories: strength; other physical properties such as thermal expansivity or conductivity, elastic moduli, and the like; resistance to scaling or other corrosive attack; changes in microstructure occurring during service; and effect of these on properties. 14 ref.
(Q general, P general, R2, SG-h)

722-Q. Deformation Characteristics of Five Grey Cast Irons at 400 and 500 Deg. C. C. R. Tottle. *Foundry Trade Journal,* v. 89, Sept. 21, 1950, p. 273-281; discussion, p. 281-282, 286, 288.

Previously abstracted from *Institute of British Foundrymen,* item 567-Q. (Q3, Q4, CI)

723-Q. Cohesion and Fracture in Metals. N. P. Allen. *Institution of Metallurgists,* "The Fracture of Metals," 1950, p. 5-28.

Crystal structure, plastic and brittle fractures, and fractures due to their combination. 17 ref.
(Q26, M26)

724-Q. Creep Fractures. R. W. Bailey. *Institution of Metallurgists,* "The Fracture of Metals," 1950, p. 29-41.

In relation to C-Mo steel.
(Q3, AY)

725-Q. Fracture By Fatigue. H. L. Cox. *Institution of Metallurgists,* "The Fracture of Metals," 1950, p. 42-67.

Salient aspects of the nature of fatigue. Emphasizes that compilation of accurate and comprehensive data is a tedious process and that there is a need for higher standards of uniformity in test material and operation of test machines. Data for cast iron and for carbon and alloy steels. 14 ref. (Q7, CI, CN, AY)

726-Q. The Effects of Rate of Loading on Fracture of Materials. C. Gurney. *Institution of Metallurgists,* "The Fracture of Metals," 1950, p. 101-116.

Effects over various times. Experimental methods. Effects of rate variations on yield strength, ultimate stress, and deformation at fracture. Presents some theoretical ideas. Data for Al, Cu, their alloys, and for carbon and stainless steels. 21 ref. (Q26, Al, Cu, CN, SS)

727-Q. Brittle Fracture of Mild Steel. W. Barr. *Institution of Metallurgists,* "The Fracture of Metals," 1950, p. 117-138.

In all-welded ships in relation to ductility at low temperatures and in the presence of stress risers.
(Q26, CN)

728-Q. Nickel-Aluminum-Molybdenum Alloys for Service at Elevated Temperatures. H. V. Kinsey and M. T. Stewart. *American Society for Metals,* Preprint No. 12, 1950, 27 pages.

The mechanical properties at 815° C. that are at least the equivalent of the best Co-base casting alloys,

and they can be produced under industrial conditions without difficulty. Tensile strength, creep-rupture properties, and effects of Co and W additions. Chemical specifications, one based on a 35,000-psi. rupture life of 150 hr. minimum at 815° C., and the other on a 35,000-psi. rupture life of 200 hr. minimum at 815° C., are developed. (Q general, Ni, SG-h)

729-Q. Grain and Grain-Boundary Composition; Mechanism of Temper Brittleness. J. W. Spretnak and Rudolph Speiser. *American Society for Metals,* Preprint No. 21, 1950, 15 pages.

The thermodynamics of interfaces and surface adsorption of solute atoms. Effect of temperature changes on adsorption. The role of surface adsorption in grain-boundary phenomena. Results with carbon and alloy steels. 19 ref. (Q23, P13, AY, CN)

730-Q. Effect of Strain Rate on Toughness of Temper-Brittle Steel. D. C. Buffum and L. D. Jaffe. *American Society for Metals,* Preprint No. 22, 1950, 5 pages.

An SAE 3140 steel was studied in the temper-brittle and unembrittled conditions. V-notched Charpy specimens were tested at different temperatures at two strain rates differing by 5,000,000:1. Transition temperature was found to be affected by strain rate in both cases. (Q25, AY)

731-Q. The Influence of Chromium on the Mechanical Properties of Plain Chromium Steels. W. O. Binder and Howard R. Spendelow, Jr. *American Society for Metals,* Preprint No. 23, 1950, 14 pages.

Mechanical properties of annealed vacuum and air-melted Cr-steels for Cr contents from 0.3 to 55%. Influence of carbon and nitrogen on the toughness of ferritic Cr steels was determined as a function of Cr content, and Cr effect in lowering the transition temperature. (Q general, N8, AY, Cr)

732-Q Rheotropic Embrittlement of Steel. E. J. Ripling and W. M. Baldwin, Jr. *American Society for Metals,* Preprint No. 24, 1950, 28 pages.

A type of brittleness under severe service conditions which can be overcome by cold working under mild service conditions. Effects of cooling, quenching, and tempering. 12 ref. (Q23, AY)

733-Q. Embrittlement of Stainless Steel by Steam in Heat Treating Atmospheres. C. A. Zapffe and R. L. Phebus. *American Society for Metals,* Preprint No. 25, 1950, 11 pages.

A bar-bend test was applied to stainless steels hardened at various temperatures in atmospheres of dry helium, normal air, and steam. Results confirm the theory of the "hydrogen potential" of steam-metal reactions, and explain numerous problems of cracking and poor ductility. (Q23, J2, SS)

734-Q. Fracturing of Silicon-Ferrite Crystals. C. F. Tipper and A. M. Sullivan. *American Society for Metals,* Preprint No. 30, 1950, 23 pages.

Neumann lamellae formation associated with cleavage fracturing was studied in tensile tests of a 3.5%-Si ferrite having large grains of similar orientation. It is shown that Neumann lamellae are unlikely causes for cleavage but that shock loading accompanying discontinuous cleavage may cause their formation. 23 ref. (Q24, Fe)

735-Q. Fractographic Registrations of Fatigue. C. A. Zapffe and C. O. Worden. *American Society for Metals,* Preprint No. 32, 1950, 12 pages.

Fatigue fractures of 75S-T6 Al alloy, mild steel, and alloy steel were studied. Two distinctive patterns are found which characterize damage from fatigue stressing, one representing a preliminary stage, and one a final stage. Structures giving rise to the patterns are referred to as "platy" and "fine lamellar", and are found to extend for a distance into the parent metal corresponding to the stresses zone. Their relationships to cyclic count and to proximity to the zone of maximum stress. A tentative explanation for fatigue is offered on the basis of the unicellar theory for the solid state. It is believed that the patterns may provide a metallographic technique by which inception and stages of fatigue failure can be recognized. (Q7, M23, Al, CN, AY)

736-Q. Effect of Alloying Elements on Notch Toughness of Pearlitic Steels. J. A. Rinebolt and W. J. Harris, Jr. *American Society for Metals,* Preprint No. 33, 1950, 27 pages.

Al, B, C, Cr, Cu, Mn, Mo, Ni, P, S, Si, Ti, and V were added separately to a steel containing 0.30% C, 1.00% Mn, and 0.30% Si. Effects on transition temperature, maximum energy, and shape of curve. No exact correlation was found between tensile properties and transition temperature, but a good correlation was found between maximum energy and reduction of area. Results. (Q23, ST)

737-Q. The Stress-Strain Energy Relationship for Metals. D. J. McAdam, Jr. *American Society for Metals,* Preprint No. 34, 1950, 23 pages.

Attention is confined almost entirely to O_2-free Cu which is practically free from structural changes other than those due to plastic strain. Influence of temperature on flow stress and influence of plastic strain on latent energy, and on the ratios of latent energy to total strain energy and work-hardening energy. How these energies vary with temperature. (Q23, Cu)

738-Q. Tension-Compression Biaxial Plastic Stress-Strain Relations for Aluminum Alloys 24S-T and 2S-O. Joseph H. Faupel and Joseph Marin. *American Society for Metals,* Preprint No. 35, 1950, 20 pages.

For both constant and variable principal biaxial-stress ratios. Variable relationships should provide a critical test to determine whether a flow or deformation-type theory agrees best with test data. It is concluded that the generalized deformation theory may be used to predict stress-strain relations for both constant and variable principal stress ratios. Tests indicate that failure by yielding is predicted in accordance with the distortion energy or von Mises-Hencky theory of failure. 28 ref. (Q23, Al)

739-Q. Strain Hardening of Mild Steel in the Torsion Test as a Function of Temperature. Hugo Larson and E. P. Klier. *American Society for Metals,* Preprint No. 37, 1950, 18 pages.

Steels tested in torsion showed extensive ductility at temperatures as low as −188° C. Torsion data were treated, using the generalized plastic-flow concept, to convert experimental torque-twist results to effective stresses and effective strains. An equation for expressing results. Values of strength coefficient and strain-hardening exponent compare favorably with results from tension tests, for temperatures at which the latter data were available. 16 ref. (Q1, CN)

740-Q. Statistical Analysis of the Effect of Alloying Elements on Mechanical Properties of Seamless Steel Tubes. W. T. Rogers. *American Society for Metals,* Preprint No. 41, 1950, 12 pages.

Evaluates the relation of C, Mn, P, Si, Ti, and Mo to yield strength, tensile strength, and elongation. Equations developed were applied in practice for two years and proved accurate within the probability limits of established standard errors. (Q23, S12, AY)

741-Q. Limiting Creep and Design Stresses for Castings Resistant to High Temperatures. Norman S. Mott. *Metal Progress,* v. 58, Oct. 1950, p. 496B.

A table covering 14 moderate and high-temperature alloys. (Q3, SG-h)

742-Q. Free-Machining Steel. *Metal Progress,* v. 58, Oct. 1950, p. 538, 540, 542. Condensed from "Free Machining Steels—A Report on Ductility and Impact Resistance", W. Lee Williams.

Previously abstracted from *Journal of the American Society of Naval Engineers;* see item 3B-208, 1949. (Q23, Q6, CN, SG-k)

743-Q. New Vanadium Steel for Deep Drawing Sheets. S. Epstein and J. W. Frame. *Iron Age,* v. 166, Oct. 12, 1950, p. 158-163.

See abstract of "Vanadium Treated, Non-Aging Rimming Steel for Deep Drawing Quality Sheet", S. Epstein, H. J. Cutter, and J. W. Frame, *Journal of Metals,* item 408-Q, 1950. (Q general, G4, ST)

744-Q. Yielding in Plain Carbon Steels. C. S. Roberts and B. L. Averbach. *Journal of Metals,* v. 188, Oct. 1950, p. 1211-1212.

Results of an attempt to correlate yield points and elastic limits with microstructure. (Q23, M27, CN)

745-Q. Rolling Texture in Aluminum. Hsun Hu and Paul A. Beck. *Journal of Metals,* v. 188, Oct. 1950, p. 1214-1215.

Making use of recent improvements in X-ray diffraction technique, quantitative pole figures were determined for rolled 2S Al. Pole figures are illustrated and analyzed. (Q24, Al)

746-Q. The Plastic Behavior of Silver Single Crystals at Various Temperatures. F. D. Rosi. *Journal of Metals,* v. 188, Oct. 1950, p. 1217.

Results of study at 205 and 295° K. (Q23, Ag)

747-Q. Alloys of Titanium With Carbon, Oxygen, and Nitrogen. R. I. Jaffee, H. R. Ogden, and D. J. Maykuth. *Journal of Metals,* v. 188, Oct. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1261-1266.

Evidence confirming that given by Finlay and Snyder on the effects of C, O_2, and N_2 on Ti. New data on effects of these elements on flow properties and phase transformations of Ti. (Q24, N general, Ti)

748-Q. Wire Strain Gages for Elevated Temperature Service. D. J. De Michele. *Product Engineering,* v. 21, Oct. 1950, p. 115-117.

Special high-temperature wire resistant strain gages for use at temperatures over 700° F., in some cases up to 1500° F. (Q25)

749-Q. How Contact Stresses Affect Gear Teeth. *SAE Journal,* v. 58, Oct. 1950, p. 22-24. Based on "Operational Stresses in Automotive Gears" by Earle Buckingham. (To be published in full in *SAE Quarterly Transactions.)*

Contact stresses in gears subject outermost surface layers to reversing tangential stresses which lead to axial cracks. Contact stresses also result in shear stress which reaches its maximum below the surface and can cause cracks running concentric with gear surfaces. The stress patterns were revealed by photo-elastic tests of cylinders and gear teeth. Cracks caused by contact stresses are shown by photomicrographs of rolls run together with combined rolling and sliding action to simulate interaction of gear teeth. (Q25, ST)

750-Q. Weigh Engine Wear Factors in Man-Made Dust Storm. *SAE Journal,* v. 58, Oct. 1950, p. 46-51. Excerpts from "Engine Wear as Affected by Air and Oil Filters", by W. S. James and B. Gratz Brown.

Details of automotive-engine tests run in a "dust tunnel", showing effects of different types of air cleaners, of oil filters, and of Cr-plated top rings. Effect of increased plating thickness was also determined. (Q9, Cr)

751-Q. Correlation of Plastic Deformation During Metal Cutting With Tensile Properties of the Work Material. J. T. Lapsley, Jr., R. C. Grassi, and E. G. Thomsen. *Transactions of the American Society of Mechanical Engineers,* v. 72, Oct. 1950, p. 979-984; discussion, p. 984-986.

Previously abstracted from *American Society of Mechanical Engineers,* Paper No. 49-A-121, Dec. 1949. See item 316-Q, 1950, (Q23, G17, ST)

752-Q. Residual Strains in Plastically Deformed Mild Steels. L. G. Finch and G. B. Greenough. *Nature,* v. 166, Sept. 23, 1950, p. 508-510.

Consists of two separate communications. In the first, by use of an accurate back-reflection X-ray technique, residual strains in plastically deformed low-carbon steels (0.06-0.15% C, 0.27-0.67% Mn) were evaluated from lattice spacings of planes parallel to the surface of previously extended plate-tensile specimens. Graph shows measured and corrected lattice strains for the (211) planes of a typical sample. In the second, results of measurement of residual lattice strains in plastically extended mild steel wires are presented in comparison with those previously reported. Concludes that whereas Heyn intergranular stresses make a considerable contribution to observed residual lattice strains, other stress systems must also be present. (Q25, CN)

753-Q. The British Non-Ferrous Metals Research Association; Creep and Fatigue Testing Equipment in the Laboratories. J. McKeown. *Metallurgia,* v. 42, Sept. 1950, p. 189-196. (Q3, Q7, A9)

754-Q. High Temperature Hardness Testing; Some Recent Russian Work. *Metallurgia,* v. 42, Sept. 1950, p. 207-208.

Testing was carried out by use of a Brinell machine equipped with a "cermet" indenter. Outlines test results on a variety of heat resistant alloys. (Q29, SG-h)

755-Q. Electronic Controller for Use With High Temperature Creep Testing Equipment. F. Gartside. *Metallurgia,* v. 42, Sept. 1950, p. 211-216.

Complete details of equipment shown by diagrams and illustrations. (Q3)

756-Q. Long or Short Samples to Test the Tensile Strength of Cast Iron? (In German.) Hans Jungbluth. *Stahl und Eisen,* v. 70, Aug. 17, 1950, p. 742-745.

Experiments were made with three different cast irons in order to determine the effect of bar length on tensile-test results. German, Swiss, and American standard specimens were used. (Q27, CI)

757-Q. (Book) Metals at High Temperatures. Frances Hurd Clark. 372 pages. 1950. Reinhold Publishing Corp., 330 W. 42 St., New York 18, N. Y. $7.00.

A compilation of recent available data on high-temperature properties. Includes a theoretical discussion on plasticity and a section on test methods and manufacturing methods for heat resistant alloys. (Q general, SG-h)

758-Q. (Book) The Properties of Metallic Materials at Low Temperatures. P. Litherland Teed. 222 pages. 1950. Chapman & Hall Ltd., London, England; John Wiley & Sons Inc., 440 Fourth Ave., New York 16. $3.50.

First of a series of monographs on metallic materials published under auspices of the Royal Aeronautical Society. Primarily intended for engineers concerned with structures and mechanisms exposed to sub-atmospheric temperatures. Numerous testing records collected from literature are presented in the form of

tables. Special attention is given to notch brittleness of ferritic steels. (Q23)

759-Q. (Book) **The Fracture of Metals.** 138 pages. 1950. Institution of Metallurgists, London.

Presents the six lectures (separately abstracted) delivered at the Institution's Refresher Course given in 1949. (Q26)

760-Q. (Book) **Electric Resistance Strain Gauges.** W. B. Dobie and Peter C. G. Isaac. 114 pages. 1948. English Universities Press Ltd., London, England; Macmillan Co., 60 Fifth Ave., New York 11. $3.50.

Difficulties encountered in using these strain gages and methods of overcoming them. Basic mathematical and electronic theory. Reviews the literature; chapter bibliographies. (Q25)

761-Q. Subzero Properties of Metal Surveyed. E. J. Ripling. *Iron Age,* v. 166, Oct. 19, 1950, p. 76-80; Oct. 26, 1950, p. 53-57.

First part: Low-temperature properties of steel, effect of embrittling agents on transition temperatures, definition of transition-temperature values, effect of tempering temperatures, and the relationship between low-temperature strength properties and stress severity. Second part: It is shown that face-centered cubic metals (most Al and Cu-base alloys, austenitic steels) retain their toughness and ductility, even at very low temperatures. The poor low-temperature performance of martensitic steels tempered near 600° F., and of most annealed steels, is at least rheotropic. (Q23, AY)

762-Q. Hardened Alloy Steel for Service Up to 700 Deg. F. *Industrial Heating,* v. 17, Oct. 1950, p. 1756, 1758. Condensed from paper by G. V. Smith, W. B. Seens, and E. J. Dulis.

Previously abstracted from *American Society for Testing Materials,* Preprint 36, 1950. See item 473-Q, 1950. (Q general, AY)

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763-Q. Three-Minute Quality Test for 85-5-5-5 Red Brass. *American Foundryman,* v. 18, Oct. 1950, p. 30-32.

Report of the A.F.S. Brass & Bronze Research Committee on fracture test as an index of melt quality. Pouring the test block and interpretation of fractures. (Q26, E10, Cu)

764-Q. Design of Steel Ring Flanges for Water Works Service—A Progress Report. Russell E. Barnard. *Journal, American Water Works Association,* v. 42, Oct. 1950, p. 931-939; discussion, p. 939-944.

Experimental program designed to obtain stress data. Details of test procedure. Develops practical method for designing flanges on the basis of the results. (Q25, T4, CN)

765-Q. Fatigue Tests of Beams in Flexure; Advance Report of Committee 15—Iron and Steel Structures. *American Railway Engineering Association, Bulletin,* v. 52, Sept.-Oct. 1950, p. 111-129.

Summary of the results of fatigue tests conducted by Prof. W. M. Wilson at University of Illinois on various types of beams similar to those used in actual structures and subjected to repeated loading cycles. Load cycle was repeated at about 150 cycles per min. until failure developed at some location in the beam. Stresses were calculated from the known loads, and fatigue strengths at 100,000 and 2,000,000 cycles were determined from an empirical equation. Fatigue data were obtained on 27 different types of beams. (Q7, CN)

766-Q. The Propagation of Plastic Deformation in Solids. Theodore von Karman and Pol Duwez. *Journal of Applied Physics,* v. 21, Oct. 1950, p. 987-994.

The stress wave caused by longitudinal impact at the end of a cylindrical bar was analyzed for the case where impact velocity is large enough to produce plastic strain. The theory gives a method for computing stress distribution along the bar at any instant during impact. Shows that, for a given material, there is a critical impact velocity above which the material should break near the impacted end with negligible plastic strain. Includes results of an experimental investigation on copper, mild steel, and iron. (Q25, Q23, Cu, Fe, CN)

767-Q. Effective Stress and Effective Strain in Relation to Stress Theories of Plasticity. G. N. White, Jr., and D. C. Drucker. *Journal of Applied Physics,* v. 21, Oct. 1950, p. 1013-1021.

Shows that the stress-strain relations of a recent theory of plasticity provide a convenient means of defining and studying effective stress and effective strain. The strong theoretical and practical limitations of such concepts are indicated; and the calculation of specific plastic work is discussed for both isotropic and anisotropic metals. 19 ref. (Q23)

768-Q. Tensile Properties of Ingot Iron at Low Temperatures. Glenn W. Geil and Nesbit L. Carwile. *Journal of Research of the National Bureau of Standards,* v. 45, Aug. 1950, p. 129-147.

True stress-strain curves obtained in tension tests at temperatures of −196° to 100° C. with ingot iron as annealed, normalized, quenched and tempered, hot rolled, and cold drawn. Numerous simultaneous load and diameter measurements were made during each test. Effects of prior thermal and mechanical treatment on true stress-strain relations. Influence of testing temperature, ferrite grain size, and initial condition of the iron on work hardening characteristics. Effects of above factors on yield stress and ultimate stress, and on true stress and true strain at maximum load and at fracture. Twinning of iron at low temperatures. 31 ref. (Q27, Fe)

769-Q. Creep of High-Purity Copper. William D. Jenkins and Thomas G. Digges. *Journal of Research of the National Bureau of Standards*, v. 45, Aug. 1950, p. 153-173.

Creep tests were made at 110, 250, and 300° F. on annealed oxygen-free high-conductivity Cu. 14 ref. (Q3, Cu)

770-Q. Thermal-Shock and Other Comparison Tests of Austenitic and Ferritic Steels for Main Steam Piping. W. C. Stewart and W. G. Schreitz. *Transactions of the American Society of Mechanical Engineers*, v. 72, Oct. 1950, p. 1043-1055; discussion, p. 1055-1060.

Thermal-shock tests of 6-in. pipe-and-valve assemblies, representing both austenitic and ferritic steels in 80 and 160 schedules. The procedure was devised to simulate conditions resulting from carry-over of boiler feedwater into main steam lines operating at 900 or 2000 psi. and 1050° F. Other test procedures include cyclic deflection tests of full-size mock-ups. Each assembly was subjected to 4000 or more deflections corresponding to expansion cycles that would occur on heating up a piping system from room temperature to 1050° F. once every two days for approximately 20 years. Laboratory stress-rupture, tensile, and fatigue tests were also conducted on the same materials, and results correlated with those of thermal-shock testing. (Q general)

771-Q. Photo-Elasticity: An Aid to Welded Design. A. Swindells. *Welding*, v. 18, Oct. 1950, p. 426-436.

The principles of photo-elasticity and its application to design problems. 23 ref. (Q25, K general)

772-Q. Summarized Proceedings of a Conference on Stress Analysis, London, 1950. E. K. Frankl. *British Journal of Applied Physics*, v. 1, Oct. 1950, p. 241-251.

Conference of the Stress Analysis Group of The Institute of Physics held in London, Apr. 3-5, 1950. Sessions were devoted to: Development work on a brittle lacquer suitable for experimental stress analysis; use of models in structural work; application of experimental stress analysis methods to soil mechanics problems; recent developments in photo-elasticity; and application of experimental stress analysis methods in the motor industry. (Q25)

773-Q. Considerations on the Relationship Between Stress and Strain in Plastic Metals. (In English.) J. H. Palm. *Metalen*, v. 5, Sept. 1950, p. 9-14.

Derivation of a recently developed stress-strain formula for isothermal homogeneous deformation in uniaxial tension or compression is further elucidated and extended on the basis of energy considerations. New methods for the determination of its constants are given. A formula, developed by Mazzoleni and based on partly different assumptions, as well as similar improved formulas, are discussed. (Q27, Q28)

774-Q. Influence of Hydrogen on Elasticity of Iron and Steel. (In French.) Paul Bastien and Pierre Azou. *Comptes Rendus* (France), v. 231, July 10, 1950, p. 147-148.

Experimental investigation, hydrogen being introduced into iron or very mild steel by electrolysis or other means. Analysis of the results indicates that the influence of hydrogen on elastic properties is only slight and of secondary importance compared to effects on plastic deformation leading to fracture. (Q21, CN)

775-Q. Crystalline Interaction and the Brittleness of Metals. (In French.) Pierre Laurent and Michel Eudier. *Revue de Métallurgie*, v. 47, Aug. 1950, p. 582-587; discussion, p. 587-588.

Discussed in the light of the theory of pseudo-isotropic media. Method of calculation of crystalline interaction and modulus of elasticity of pseudo-isotropic polycrystals. Results, particularly in their application to study of brittleness of metals. (Q23, Q21, M26)

776-Q. Study of the Shape of Tensile Test Curves for Metals and Their Physical Interpretation. (In French.) Ch. Crussard and B. Jaoul. *Revue de Métallurgie*, v. 47, Aug. 1950, p. 589-600; discussion, p. 600.

Theoretically analyzes different sections of the tensile test curves of metals, using the relation between stress and elongation developed by Lacombe during his study of creep. Physical meaning of the individual

sections is indicated. 10 ref. (Q27)

777-Q Stress-Deformation Curves for Light Alloys. (In French.) M. Renouard. *Revue de Métallurgie,* v. 47, Aug. 1950, p. 614-618.

Analyzes curves for AU4G, AG3, AG6, and several duralumin alloys. Essential character of the curves is variation of stress with log. deformation in the interval between 0.01 and 2.0. (Q24, Al)

778-Q. Static Testing and Calculation of Spot-Weld Properties Under Shear-Tensile Stress. (In German.) H. Zschokke and R. Montandon. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 16, Sept. 1950, p. 257-271.

Test procedures. Shows that optimum conditions for spot welding depend on properties and thickness of the material, all of which can be mathematically formulated. Method of calculating shear strength. Results obtained with carbon and stainless steels, Al, and Al alloys. 15 ref.
(Q2, Q27, K3, CN, SS, Al)

779-Q. Applied Theory of Plastic Deformation of Rods. (In Russian.) Yu. I. Yagn and E. N. Tarasenko. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, July 21, 1950, p. 471-474.

Mathematical analysis. (Q23)

780-Q. The Fracture Process in Plastic Metals. (In Russian.) Ya. B. Fridman and T. K. Zilova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, Aug. 1, 1950, p. 697-700.

Study of the process from its initial stages to the point of failure, using a macroscopic method. A mesh design impressed into the specimen by a rolling process is used to follow the stages of deformation. Application to the steel designated as "40KhNMA." (Q26, ST)

781-Q. Internal Stresses in Semi-finished and Finished Brass Products. (In Czech.) Petr Skulari. *Hutnické Listy,* v. 5, July 1950, p. 265-274.

Applying his own theory of the origin of internal stresses, the author shows that the cause of cracking of brass—either spontaneous or during working—is internal stress of the second order arising between individual crystals because of size differences. On the basis of experiments, it is concluded that annealing treatment based on the type of brass and its reduction is the only way to remove harmful internal stresses. (Q25, Cu)

782-Q. Origin and Cause of Coarse-Grained Intercrystalline Fractures in Certain Alloy Steels. (In Czech.) Vladimir Koselev. *Hutnické Listy,* v. 5, Aug. 1950, p. 309-316.

Defines intergranular fracture and its origin. The relation between intergranular fracture and microstructural changes occurring during cooling from a high temperature were studied. Also, a fractographic study was made of fractures formed under various conditions. Concludes that the tendency to intergranular fracture is a transitory phenomenon appearing in a certain production phase and does not necessarily indicate an inherent material defect. Work was done on a steel containing 0.45% C and 2% Ni; some work on 18-8 stainless and on steels whose carbides were stabilized with vanadium. 27 photomicrographs. (Q26, AY)

783-Q. Effects of Certain Addition Agents Upon the Frictional and Wear Characteristics of Powder Metallurgy Bronzes. J. H. Dedrick. *ASTM Bulletin,* Oct. 1950, p. 46-50.

An analytical study to determine the specific effect of addition agents to a basic powder-metallurgy bronze, on coefficient of friction and wear rates, when running against steel. Primary components made from powders or otherwise were tested. In addition, binary and ternary combinations were studied in order to interpret the behavior of the more complex compositions now used industrially. (Q9, Cu)

784-Q. Statistical Properties of Fatigue Data on 24S-T Aluminum Alloy. A. K. Head. *ASTM Bulletin,* Oct. 1950, p. 51-53.

Results of rotating cantilever fatigue tests of 185 specimens of 24S-T Al alloy with seven different surface finishes were used to test four hypotheses on the constancy of scatter at different applied stresses. None of the four hypotheses adequately fits the data. (Q7, Al)

785-Q. The Effect of Nitrogen on Brittle Behavior of Mild Steels. G. H. Enzian and G. J. Salvaggio. *Welding Journal,* v. 29, Nov. 1950, p. 537s-544s.

Investigation showed that the effect of N may not be as pronounced as previously indicated. In steels with low Mn-C ratios, little or no change in brittle behavior was found with N variations within the range normally obtained by various openhearth practices. Steels with higher Mn-C ratios exhibited, in general, somewhat better properties, but these were more susceptible to variation with change in N content. Comparisons of tests and criteria used to determine transition temperatures. A good correlation was found between ductility transi-

tion temperature and sensitivity to cold work. 21 ref. (Q23, CN)

786-Q. Stresses Around a Spot Weld Under Static and Cyclic Loads. Georges Welter. *Welding Journal,* v. 29, Nov. 1950, p. 565s-576s.

Distribution of stresses was studied as a function of applied static tension loads, using mild steel and Alclad 24S-T sheet. A new type of measurement was made of stresses at the inside surfaces of the joints. Technique and results. (Q25, K3, CN, SS, Al)

787-Q. Properties of Nickel Silvers. *Nickel Bulletin,* v. 23, July 1950, p. 122-125.

Physical and mechanical properties of nine alloys. Equilibrium diagrams. (Q general, P general, M24, Cu)

788-Q. How To Evaluate Deep Drawing Quality Steel. S. Epstein and J. W. Frame. *Iron Age,* v. 166, Nov. 9, 1950, p. 88-92.

Use of a large bulge test, similar to the Olsen cup test, but very much larger. In this way uniform elongation can be measured directly and the sheet is tested transversely as well as longitudinally. The new test is said to come closer to evaluating drawing quality than those used heretofore. Effects of microstructures, inclusions, and alloy residuals on drawability. Bulge-test results for two typical lots are correlated with drawability. (Q23, CN)

789-Q. Hydrogen Embrittlement of SAE 1020 Steel. J. B. Seabrook, N. J. Grant, and Dennis Carney. *Journal of Metals,* v. 188, Nov. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1317-1321.

Hot rolled SAE 1020 machined into tensile-test bars was cathodically charged with hydrogen. Vacuum tin-fusion analysis provided accurate values of hydrogen. True stress-true strain tensile tests with and without aging of the test bars and at various strain rates indicate the role of hydrogen as an embrittling agent. 13 ref. (Q23, CN)

790-Q. A Simple Torsion Pendulum for Measuring Internal Friction. M. E. Fine. *Journal of Metals,* v. 188, Nov. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1322.

Equipment, and data for several nonferrous alloy wires. (Q22, EG-a)

791-Q. Fatigue Weakness of Surfaces. J. O. Almen. *Product Engineering,* v. 21, Nov. 1950, p. 117-140.

Shortcomings in current testing procedures and concepts that should be corrected by careful analysis and evaluation of weakness of the surfaces of materials in fatigue. Theory and practice of shot peening, peening while the material is being stressed, measurement of residual stress, prestressing, effect of removal of stress raisers, residual stress induced by mechanical operations, by thermal treatment, by case-hardening, by nitriding, and by carburizing. 35 ref. (Q7, G23)

792-Q. Variation of Amplitude-Dependent Internal Friction in Single Crystals of Copper With Frequency and Temperature. Arthur S. Nowick. *Physical Review,* ser. 2, v. 80, Oct. 15, 1950, p. 249-257.

Quantities are introduced which express the dependence of internal friction and of Young's modulus on strain amplitude, and it is shown that these quantities are significant measures of the properties of a crystal. Measurements made between −60 and 33° C. show that observed internal friction can be expressed as the product of a function of temperature and a function of amplitude alone. The data also indicate that internal friction and elastic modulus are frequency-independent when the structure sensitivity of the material is taken into account. The results are considered in terms of a mechanism of relaxation by which dissipation is controlled through a rate process; and one of simple hysteresis, by which the stress-strain loop is independent of the rate of traversal. Shows that the latter mechanism gives much better agreement with experimental facts. 10 ref. (Q22, Q21, Cu)

793-Q. Residual Stresses in Magnesium: Technique and Results. George H. Found. *Proceedings of the Society for Experimental Stress Analysis,* v. 8, no. 1, 1950, p. 1-13.

A measuring method which minimizes and segregates the effect on residual stress of cold working in the cutting operation. It was found that differential residual stresses in castings are of maximum magnitude in the as-cast state and seem to be reduced in inverse proportion to the temperature of heat treatment. In heat treated castings they appear to be of low magnitude with respect to safe loading-stress ranges. (Q25, Mg)

794-Q. Letter to the Editor. Edward Wenk, Jr. and Thomas D. Tuft. *Proceedings of the Society for Experimental Stress Analysis,* v. 8, no. 1, 1950, p. 14-16.

Technique for protecting wire-resistance strain gages when located under water at high pressure. The primary element consists of a thin

rubber sheet which is cemented over a strain gage after the gage has been prepared in the usual fashion. (Q25)

795-Q. An Industrial Method for the Determination of Residual Stresses. W. Soete and R. Vancrombrugge. *Proceedings of the Society for Experimental Stress Analysis,* v. 8, no. 1, 1950, p. 17-26; discussion, p. 26-28.

A method similar to that of Mathar, but using electrical resistance wire strain gages instead of dial extensometers, which eliminates unsteady and irregular readings during the drilling operation. (Q25)

796-Q. The Influence of Bolt Tension and Eccentric Tensile Loads on the Behavior of a Bolted Joint. T. J. Dolan and J. H. McClow. *Proceedings of the Society for Experimental Stress Analysis,* v. 8, no. 1, 1950, p. 29-43.

Strains developed in bolted joints loaded with forces applied perpendicular to the surfaces of contact of the two members joined. Derives an approximate expression for the stresses developed in the critical areas. Laboratory study of strains in a conventionalized model. 11 ref. (Q25, K13)

797-Q. A Deflection Rate Method for Determining Structural Yield. J. M. Coe. *Proceedings of the Society for Experimental Stress Analysis,* v. 8, no. 1, 1950, p. 45-50.

A new method of treating deflection readings to determine the proportional limit in a specimen under static loads. It is especially adapted to testing major components of an airframe. It permits rapid evaluation of data from a large number of deflection readings. (Q21)

798-Q. The Method of Oblique Incidence in Photoelasticity. D. C. Drucker. *Proceedings of the Society for Experimental Stress Analysis,* v. 8, no. 1, 1950, p. 51-66.

Some available methods for the analysis of three-dimensional states of stress, in particular, the photoelastic "freezing" technique. Problems of accuracy for the principal plane and the two-dimensional case. The procedure using a single oblique photograph is compared with use of double oblique incidence. Also an alternative double oblique incidence procedure is presented in which retardation values alone accurately determine the magnitude of the principal stress differences. 11 ref. (Q25)

799-Q. A Frame for Testing Structural Models. Edward Wenk, Jr. *Proceedings of the Society for Experimental Stress Analysis,* v. 8, no. 1, 1950. p. 67-78.

Test frame developed and in use at David Taylor Model Basin, which provides for multidirectional application of forces at a plurality of points so that effects of simultaneous service loadings may be duplicated. Includes examples of application. (Q)

800-Q. Tests of Columns Under Combined Thrust and Moment. Lynn S. Beedle, Joseph A. Ready, and Bruce G. Johnston. *Proceedings of the Society for Experimental Stress Analysis,* v. 8, no. 1, 1950, p. 109-132.

Test equipment developed to apply various desired combinations of axial load and end moments to 8, 12, and 16-ft. steel columns. Behavior of test columns under load was determined by using four measuring techniques: taut-wire and mirror deflection gages, level bars, SR-4 strain gages, and whitewash. The moment-producing thrust was measured by aluminum tube dynamometers. (Q25, CN)

801-Q. Characteristics of Electric Strain Gages at Low Temperatures. E. E. Day. *Proceedings of the Society for Experimental Stress Analysis,* v. 8, no. 1, 1950, p. 133-142.

See abstract of "Effects of Low Temperatures on Electric Strain Gages", *Trend in Engineering at the University of Washington,* item 143-Q, 1950. (Q25)

802-Q. A Method for the Determination of Initial Stresses. C. Riparbelli. *Proceedings of the Society for Experimental Stress Analysis,* v. 8, no. 1, 1950, p. 173-196.

The method consists of introducing a circular discontinuity in the surface of a body possessing residual stress, and measuring by means of electric strain gages the resulting stresses occurring in the vicinity of the hole. Includes mathematical analysis. (Q25)

803-Q. The Design of a High-Speed Polariscope. J. J. Baruch. *Proceedings of the Society for Experimental Stress Analysis,* v. 8, no. 1, 1950, p. 197-204.

A small, portable photo-elastic polariscope for application to dynamic or static loading conditions. Photoelastic stress patterns are compared with those of the standard polariscope for static conditions. Illustrations of dynamic applications. (Q25)

804-Q. Deformation Textures in Face-Centred Cubic Metals. E. A. Calnan and C. J. B. Clews. *Philosophical Magazine,* v. 41, Nov. 1950, p. 1085-1100.

From a qualitative treatment of the deformation of polycrystalline aggregates it was possible to derive for face-centered cubic metals, a tensile stress-elongation curve in

satisfactory agreement with experiment and with that previously derived by Taylor; and tension, compression, rolling, and wiredrawing textures in reasonable agreement with observation. An attempt is made to give a clearer physical explanation of the deformation process. It may be possible to extend the treatment to body-centered cubic metals. 11 ref. (Q24)

805-Q. A Theory of the Plastic Bulging of a Metal Diaphragm by Lateral Pressure. R. Hill. *Philosophical Magazine,* v. 41, Nov. 1950, p. 1133-1142.

Explicit formulas are obtained for the stresses which appear during the above process. The predicted influence of work hardening on shape of the profile, and on relation between polar strain and curvature, agrees well with experimental data. A simple expression is developed for instability strain. (Q25)

806-Q. Deformation Texture of Drawn Face-Centred Cubic Metal Wires. Walter R. Hibbard. *Journal of the Institute of Metals,* v. 77, Aug. 1950, p. 581-584.

Theoretical considerations indicate that the deformation texture of drawn face-centered-cubic metal wires should be a single orientation rather than the double orientation previously reported. X-ray analyses of wires drawn 98% show essentially a single texture for Pb, Ni, Cu, Al, Ag, and Au, in support of this theory. 16 ref.
(Q24, Pb, Ni, Cu, Al, Ag, Au)

807-Q. The Correlation Between Different Hardness Numbers for Grey Cast Iron. (In English.) Jan Wozniacki. "International Gieterij Congres 1949—Amsterdam", p. 162-170; discussion, p. 170.

Revises, completes, and converts existing tables, formulas, and nomograms using Brinell hardness numbers from 120 to 230. (Q29, CI)

808-Q. The Influence of Oxygen, Nitrogen and Carbon on the Impact Strength of Iron and Steel. (In English.) J. D. Fast. "International Gieterij Congres 1949—Amsterdam", p. 171-181; discussion, p. 181-183.

See abstract of "Investigations Into the Impact Strength of Iron and Steel", *Philips Technical Review,* item 292-Q, 1950. (Q6, Fe, ST)

809-Q. Damping Capacities of S.A.E. 1020 and 2320 Steels. Lester Tarnopol and James R. Morgan. *Transactions of the Indian Institute of Metals,* v. 1, June 1948, p. 55-69.

Damping capacities were studied as a function of maximum fiber stress after various anneals and case carburization. It was found that machining increases the damping while subsequent aging or annealing decreases damping. Changes in damping capacity observed at high stress could be accounted for by assuming that plastic slip was an important factor. (Q8, CN, AY)

810-Q. Effect of Rust-Preventive Silumin Coatings in the Interior of Riveted Joints of ST52 on Their Tensile-Fatigue Strength. (In German.) Otto Graf. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, Sept. 11, 1950, p. 747.

Experimental results on joints in structural steel. (Q7, L15, CN)

811-Q. Wire Fracture and Its Relationship to the Decision as to When to Discard Cables on Hoisting Equipment. (In German) O. Sander. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, Sept. 21, 1950, p. 763-766.

Rules for deciding when to discard cables, based on breakage of a certain number or percentage of individual wires within a specified length of cable; also the factors that cause the wire "breaks" and their effects on the tensile and bending strength of a given cable.
(Q26, CN)

812-Q. Behavior of Steel at Elevated Temperatures. Survey of Literature for the Years 1948 and 1949. (In German.) Anton Pomp. *Stahl und Eisen,* v. 70, Aug. 31, 1950, p. 791-794; Sept. 14, 1950, p. 848-853.

Mechanical-test apparatus. Second part charts and tabulates elevated-temperature properties of various stainless and high-alloy steels. 65 ref. (Q general, AY, SS, SG-h)

813-Q. Testing the Wear Resistance of Surfaces. (In German.) H. Meincke. *Metalloberfläche,* sec. A, v. 4, Oct. 1950, p. 145-151.

Frequently used methods of materials testing (such as hardness testing) are unsuited to the measurement of wear resistance. Describes a method of testing wear resistance as a suggestion for standardizing testing practices under comparable conditions. Equipment used. (Q9)

814-Q. Recent Results With Respect to Work-Hardening During Plastic Deformation of Crystals. I. Shear Stressing of Long Crystals. (In German.) Fritz Röhm and Albert Kochendörfer. *Zeitschrift für Metallkunde,* v. 41, Aug. 1950, p. 265-272.

Three proposed explanations were studied experimentally. Apparatus and procedure. Results for 99.998% Al are compared with those of other investigators. 24 ref. (Q24, Al)

815-Q. The Technological Properties of Mg-Ce-Zn Cast Alloys. (In German.) G. Siebel and H. Vosskühler. *Metall*, v. 4, Sept. 1950, p. 370-374.

Shows that 0.7-1.5% Ce added to Mg-Zn alloys materially increases the strength properties and density of sand and chill castings and that malleable Mg-Ce-Zn alloys have excellent strength properties, especially when age hardened at elevated temperatures. Effects of Fe and Si content on structure and of Ce on density; also effects of Ag, Ca, Sn, Mn, Al, Zr, and Be. (Q23, P10, Mg)

816-Q. Evaluation of Fatigue-Test Data in Materials Testing. (In German.) W. Späth. *Metall*, v. 4, Sept. 1950, p. 374-377.

Proposes that, in Wöhler diagrams, stress be plotted as a function of rate of fracture. By this method, the desired critical stress is clearly indicated by the intersection of a straight line and the ordinate. Practical application to steel, Pb alloys, and Al alloys. (Q7, ST, Pb, Al)

817-Q. Scaffolds of Light Metal. (In German.) O. Stockmar. *Metall*, v. 4, Oct. 1950, p. 421-422.

Application of Al alloys. Tables and graphs show mechanical properties. (Q general, T26, Al)

818-Q. Estimation of the Properties of Cast Iron by Chill Tests. (In Japanese.) Nobuaki Ogura. *Journal of the Casting Institute of Japan*, v. 22, no. 6, 1950, p. 1-9.

Small wedge-shaped castings were used as test pieces for the relationships between chilled thickness, chemical compositions, and tensile strengths. 10 ref. (Q27, CI)

819-Q. Flexure Tests on Copper. *Iron Age*, v. 166, Nov. 16, 1950, p. 90.

Special tests made by Revere Copper and Brass, to determine the best design of copper expansion joints for concrete slabs and walls, masonry walls, and other places where weather conditions require provision for alternate expansion and contraction. (Q5, Cu)

820-Q. Causes and Prevention of Drill Collar Failures. Stanley C. Moore. *Drilling*, v. 12, Nov. 1950, p. 28, 30, 85.

Practically all drill-collar failures noted in the field are the result of fatigue at the connections—either simple fatigue in the case of the pins, or corrosion fatigue in the case of the boxes. Recommended operating procedures and design. Use of a Mg ring in the drill-collar box to prevent corrosion in the bore near the ring, by electrochemical action. (Q7, R10, T28, S1, Mg)

821-Q. Explosive Forces Widen Metallurgical Studies. *Steel*, v. 127, Nov. 20, 1950, p. 98-99. Based on U. S. Navy, Bureau of Ordnance, report by John S. Rinehart.

How extreme pressures, often as much as 5,000,000 psi., furnished by explosive charges, are being used to help shed more light on the resistance of metals and mechanical systems to forces accompanying aircraft landings and machine impact. (Q25)

822-Q. Surface Effects in Creep of Cadmium Crystals. D. J. Phillips and N. Thompson. *Proceedings of the Physical Society*, v. 63, sec. B, Nov. 1, 1950, p. 839-847.

A recording rate-of-strain meter was used to investigate changes in creep rate when the chemical environment of a stressed cadmium crystal is altered. Experiments were made with aqueous solutions of a number of inorganic salts of Cd. Measurements were also made of the effect of very thin films, formed by immersion in distilled water. When the films were removed with dilute H_2SO_4, a sudden small strain increment was observed, the magnitude of which depended on film thickness. Possible explanations. 18 ref. (Q3, Cd)

823-Q. Creep in a Precipitation-Hardened Alloy. M. Davis and N. Thompson. *Proceedings of the Physical Society*, v. 63, sec. B, Nov. 1, 1950, p. 847-860.

Measurements were made of the creep shown by polycrystalline wires of a hardened alloy (Cu + 3% Ag) both at room temperature and 90° K. Results are interpreted in terms of the Mott-Nabarro theory of transient creep. Agreement between theory and experiment is qualitatively satisfactory. (Q3, Cu)

824-Q. The Creep of a Nominally Isotropic Magnesium Alloy at Normal and Elevated Temperatures Under Complex Stress Systems. A. E. Johnson. *Metallurgia*, v. 42, Oct. 1950, p. 249-262.

Purpose of the investigation was to examine the nature of the creep of an initially isotropic cast Mg alloy at temperatures of 20 and 50° C., and under general stress systems. Some 40-50 tests consisting of pure tensile, pure torsion, and complex-stress creep tests were performed. Results are analyzed, and equations for the stress-strain relations over the above temperature range are developed. 16 ref. (Q3, Mg)

825-Q. A Study of the Mechanism of Fracture of Metals. (In French.) Georges A. Homes and Jacques Gouzou. *Revue de Métallurgie*, v. 47, Sept.

1950, p. 678-692.

Experimentally investigated for Zn and mild steel. Influencing factors, such as chemical and crystallographic nature of material, degree of purity, structural state, temperature, and rate of application of load. The mechanism of fracture is tentatively explained. (Q26, Zn, CN)

826-Q. Results of Research on Stress Patterns Conducted at Instito di Costruzione di Macchine, University of Palermo. (In Italian.) Giuseppe Manzella. *Metallurgia Italiana,* v. 42, July 1950, p. 249-254.

Principal results of work done from 1938 to 1949 on stress patterns in shafts subjected to torsion, and in perforated plates. The first were studied by use of electrical analogies; the second by photo-electric methods. 11 ref. (Q25)

827-Q. Short-Time Endurance Tests on Fe-Cr-Al Resistor Alloys. (In Italian.) M. Signora and F. Baldi. *Metallurgia Italiana,* v. 42, July 1950, p. 255-260.

Results of a series of tests, based on ASTM B76-39 specifications, made to determine optimum procedures. It was found inconvenient to test to rupture. Instead the tests are considered completed when electrical resistance has increased by a given amount. The three alloys tested contained 19.13-24.50% Cr and 2.15-4.21% Al. (Q7, P16, SG-q, Fe)

828-Q. Experimental Research on a Model of a Horizontal Aluminum Tank. (In Italian.) C. Castiglia and F. Levi. *Alluminio,* v. 19, no. 4, 1950, p. 319-323.

Use of a 1/5th-scale model of a particular type of tank. Strain gages were used to study stresses and strains encountered. Calculations necessary to convert the results to those valid for the full-sized tank. (Q25, T26, Al)

829-Q. Effect of Silicon on the Mechanical Properties and Micrographic Structure of Alcoa 195 Alloy. (In Italian.) F. de Thierry. *Alluminio,* v. 19, no. 4, 1950, p. 334-339.

Amount of elongation under different temperatures and loads was the principal mechanical property studied. The alloy contains 4-5% Cu, and not more than 1.50% Si, 0.80% Fe, 0.30% Mn, and 0.20% Ti. (Q27, M27, Al)

830-Q. Strength Tests on Completely Welded Railroad Passenger Cars of Light Steel Construction. (In French and German.) E. R. Steiner. *Zeitschrift für Schweisstechnik; Journal de la Soudure,* v. 40, Oct. 1950, p. 169-177.

Tests made to determine mechanical strength. (Q23, T23, CN)

831-Q. Comparison of Results of Hardness Measurements. (In Polish.) J. Wozniacki. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 2, no. 3, 1950, p. 197-211.

Theoretical survey of the concept of hardness; compares experimental results from the literature. Test variables which have an influence on hardness number, i.e., deformation of penetrator and indentation, angle deformation, size of loading of penetrator, etc. Possibility of comparison of hardness numbers obtained by the Brinell, Ludwik, and Vickers methods. 14 ref. (Q29)

832-Q. Schematic Diagrams for the Mechanical State. (In Russian.) S. I. Gubkin. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Aug. 1950, p. 1165-1182.

Two types of diagrams which form a firm basis for classification of mechanical states, mechanisms of plasticity, and basic methods of press working of metals. Special features of each type of diagram. Theoretical derivations are based on tensor analysis. (Q23, G1)

833-Q. Determination of Local Wear by Use of Oval Depressions. (In Russian.) M. M. Khrushchov and E. S. Berkovich. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, Aug. 11, 1950, p. 909-911.

Method in which an oval depression is made in the part subject to frictional wear. Decrease in depth of the groove is taken as a basis for calculation of the wear. Details of procedure. (Q9)

834-Q. Plasticity of High-Temperature Modifications of Polymorphous Metals. (In Russian.) E. M. Savitskii. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, Aug. 11, 1950, p. 945-947.

Studied theoretically and experimentally for a large number of metals. Crystalline modifications at high and low temperatures are described qualitatively for Li, Cs, Be, Ca, Se, La, Cs, Pr, Nd, Ti, Zr, Hf, Cr, U, Mn, Fe, Co, Tl, and Sn. As a rule, the high-temperature modification has the greatest plasticity. (Q23)

835-Q. Concentration of Deformation and Stresses During Large Plastic Deformations. (In Russian.) Ya. B. Fridman and T. K. Zilova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR),

new ser., v. 73, Aug. 21, 1950, p. 1185-1188.

Studies using the method of a rolled-on mesh pattern. Local deformations are determined from distortions of the pattern. Coefficient of deformation concentration was calculated to be the ratio of maximum shear to mean shear. Application of the results to the study of stress concentration in different types of test specimens (plain and notched) is indicated. (Q24, Q25)

836-Q. Influence of Surface-Active Substances on Fatigue Strength of Steel. (In Russian.) G. V. Karpenko. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, Aug. 21, 1950, p. 1225-1228.

Two steels (20X and 40X) subjected to different heat treatments were investigated during contact with the following media: air, water, 2% $C_5H_{11}OH$ in water, lubricating oil + 2% oleic acid, and castor oil + 2% linoleic acid. (Q7, CN)

837-Q. Problem of Formation of Fatigue Microfissures. (In Russian.) G. V. Karpenko. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Sept. 1, 1950, p. 95-98.

Theoretical explanation, based on Rebinder's theory (1947). Results of experimental investigation of effects of surface-active agents on fatigue strength of carbon steel (20X). (Q7, CN)

838-Q. Dependence of Microhardness of Structural Parts on the Composition of Some Binary Cast Alloys. (In Russian.) A. M. Korol'kov and E. S. Kadaner. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Sept. 11, 1950, p. 271-274.

Experimentally investigated for Al-Ni, Pb-Sb, Al-Mn, and Sn-Sb alloys, in order to determine, in each case, which constituent has the major effect on hardness.
(Q29, Al, Ni, Pb, Sb, Mn, Sn)

839-Q. (Book) **Physical and Mechanical Characteristics of Materials for Pressure Vessels: an Annotated Bibliography. Vols. I-IV. Unpaged. Pressure Vessel Research Committee of the Welding Research Council,** 29 W. 39th St., New York 18, N. Y.

Periodical literature on flow and fracture of metals in general, mechanical properties of ferrous materials for pressure vessels, and test procedures. The bibliography is in the form of an abstract file. Each of approximately 3000 items is reproduced within a 4 x 6 card outline, two to a sheet, printed on one side only. Each includes title, authors, primary reference, and any secondary references (republications, abridgments, translations, etc.). Most of the abstracts are reproduced from one of the well-known abstract journals. Vol. I comprises a subject-index file of the abstracts in the subsequent three volumes. Vol. II covers literature published in 1937 and 1938; Vol. III, 1939-1943; and Vol. IV, 1944-1947.
(Q general, T25, ST)

840-Q. (Book) **Theory of Flow and Fracture of Solids. Vol. 1. Ed. 2.** A. Nadai. 572 pages. 1950. McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. $10.00.

New chapters discuss the theories of simple and composite substances based on the types of strains—elastic, permanent, or a combination of both—and on the types of laws of deformation postulated. Treatment includes metals. Footnote references. (Q24, Q26)

841-Q. (Book) **An Introduction to Experimental Stress Analysis.** George Hamor Lee. 319 pages. 1950. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. $5.50.

Surveys all aspects of the subject. References for more advanced study follow each chapter. (Q25)

842-Q. (Book) **The Properties of Aluminium and Its Alloys. Ed. 3.** 55 pages. Information Bulletin No. 2, 1949, Aluminium Development Association, 33 Grosvenor St., London W.1, England. 1s.

Physical and mechanical properties of Al casting and wrought alloys, durability, and methods of working alloys in relation to properties. 15 extensive tables of data. Average weights of Al alloys in standard forms and correlations of British aircraft and other standards are presented in appendixes.
(Q general, S22, Al)

843-Q. (Book) **Neuere Festigkeitsprobleme des Ingenieurs.** (Modern Strength-of-Materials Problems of Engineers). K. Marguerre. 253 pages. 1950. Springer-Verlag, Berlin, Germany. 25.50 DM.

Experimental methods of stress determination, stress problems which involve the theory of elasticity, an introduction to vibration mechanics, solution of vibration problems, and stability problems having a close relation to the problem of vibration. (Q21, Q23, Q25)

844-Q. New Notes on High-Strength Heat Treated Steels. G. Sachs, G. S. Sangdahl, and W. F. Brown, Jr. *Iron Age,* v. 166, Nov. 23, 1950, p. 59-63; Nov. 30, 1950, p. 76-80.

The conventional classification of heat treated, high-strength steels according to hardenability is shown to be incomplete. Notch-bar tensile tests reveal large differences in properties of specimens heat treated to nearly identical hardness, tensile strength, and elongation. Strength and ductility of high-strength steels depend upon their chemistry and structure, as shown by static and impact notch-bar test results. Steels investigated were SAE Nos. 2340, 5140, T-1340, and 1050. 17 ref.
(Q general, J26, CN, AY)

845-Q. On the Endurance Limit of a Round Bar With Longitudinal Grooves. H. Okubo. *Journal of Applied Physics,* v. 21, Nov. 1950, p. 1105-1108.

In a previous paper, it was concluded that the endurance limit of a material should be determined by the amount of the mean stress in a certain area around a point, instead of the stress at the point. The extent of the area was determined for several metals, by using the results of tension-compression fatigue tests. In this paper, extent of area where the mean value of stress is to be taken is determined for a mild steel by a torsion-fatigue test. It is concluded that extent of area chiefly depends on the kind of metal and is independent of experimental methods. (Q7)

846-Q. On the Fredrickson-Eyring Theory of the Mechanical Behavior of Metals. J. Fleeman and G. J. Dienes. *Journal of Applied Physics,* v. 21, Nov. 1950, p. 1193-1194.

Critically analyzes this theory. Indicates that it predicts too much strain hardening and also a relaxation time for deformation recovery which is much too small. Therefore, it fails to account for the permanent deformation in steel in the range — 70 to 100° C. (Q24)

847-Q. Vibration and Fatigue Life of Steel Strand. J. C. Little, D. G. MacMillan, and J. V. Majercak. *Electrical Engineering,* v. 69, Dec. 1950, p. 1065. (Condensed from paper to be published in *AIEE Transactions,* v. 69, 1950.)

Investigation for galvanized carbon, and stainless steel wires. Effects of temperature variation from —55 to 200° F. (Q7, CN, SS)

848-Q. Precision Investment Nonferrous Casting Alloys. *Materials & Methods,* v. 32, Nov. 1950, p. 97, 99.

Tables give nominal compositions, physical and mechanical properties of 9 Cu, 3 Co, 5 Al, and 4 Ni alloys of above type.
(Q general, P general, E15, Cu, Co, Al, Ni)

849-Q. Wire Testing and the Evaluation of Common Tests Applied to Steel Rope Wire. L. R. Steuer. *Wire and Wire Products,* v. 25, Nov. 1950, p. 978-979, 1005.

Nine mechanical test procedures. The three most common types are gage, tensile, and torsion testing.
(Q general, CN)

850-Q. Notch Sensitivity of Various Cast Materials. T. E. Eagan. *American Foundryman,* v. 18, Nov. 1950, p. 22-24.

Results of fatigue tests on both notched and unnotched specimens of AISI 1040 forged steel, cast steel, class 70 acicular gray iron, ductile or nodular cast iron, and class 50 gray iron. Photomicrographs show structures of the five materials.
(Q7, CN, CI)

851-Q. The Physics of the Deformation of Metals. E. N. da C. Andrade. *Endeavour,* v. 9, Oct. 1950, p. 165-177.

A descriptive review and analysis of some recent work. Illustrations include photomicrographs, X-ray patterns, molecular models, and soap-bubble arrays. 16 ref. (Q24)

852-Q. Fatigue Strength of Cable Wire and of the Cable Itself. (In German.) Hermann Donandt. *Archiv für das Eisenhüttenwesen,* v. 21, Sept.-Oct. 1950, p. 283-292.

Surveys literature. Correlates fatigue strengths of load-carrying cables and of their individual wires subjected to tensile and vibrational stresses. Present methods for calculating the strength of wire cables are deceptive since they fail to consider vibrational stresses to which the cables are subjected. 44 ref. (Q7, T7, ST)

853-Q. Yield Point and Aging of Soft Steel. (In German.) Georg Masing. *Archiv für das Eisenhüttenwesen,* v. 21, Sept.-Oct. 1950, p. 315-323; discussion, p. 324-325.

Atomic theory of the deformation of metals, the mutual effect of displacements and metal additions, behavior at blue heat, the mechanical aging of steel, and nature of the yield point of undeformed steel. 21 ref. (Q23, N7, CN)

854-Q. Creep Strength of Pure Aluminum and of the Al-Mg-Si Alloy "Pantal" at 25 and 50° C. (In German.) Karl Wellinger and Ernst Keil. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, Oct. 11, 1950, p. 817-820.

Experiments made up to 1000 hr. show that these materials creep at room temperature even below the 0.2 yield point; and that at 50° C. creep strength drops 6-11%. The

cold worked material has a greater tendency to creep than the annealed material. (Q, Al)

855-Q. Some Physical Properties of Eight Refractory Oxides and Carbides. James J. Gangler. *Journal of the American Ceramic Society,* v. 33, Dec. 1, 1950, p. 367-374; discussion, p. 374-375.

Compositions of the ceramics investigated included beryllium oxide, magnesium oxide, stabilized zirconia, zircon, boron carbide, 85% silicon carbide plus 15% boron carbide, titanium carbide, and zirconium carbide. Short-time tensile strengths were determined at 1800 and 2200° F. Resistance to thermal shock was determined by rapid cooling in air from 1800, 2000, 2200, and 2400° F. Thermal-expansion characteristics were studied from room temperature to 1100° F. Hot-pressing of these bodies indicated that a density of at least 93% of theoretical could be obtained. (Q27, P11, H11, C-n, B, Si, Ti, Zr)

856-Q. Measurement of Low Order Ductility. Norman P. Pinto. *Journal of Metals,* v. 188, Dec. 1950, p. 1444.

Method which involves bending of a bar over a form in which radius of curvature decreases progressively. Radii at each point are predetermined and elongation is read from a graph of radius of curvature at point of fracture vs. known bar thickness. The method has been used successfully for beryllium and tungsten specimens. (Q23, Q5)

857-Q. The Torsion Texture of Copper. W. A. Backofen. *Journal of Metals,* v. 188, Dec. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1454-1459.

Pole figures are presented which describe the texture of OFHC and electrolytic, tough-pitch Cu subjected to various amounts of torsional strain. Development of the torsion texture does not appear to be influenced by the principal normal strain history since all pole figures are symmetrical about directions parallel and perpendicular to the longitudinal axis of the torsion specimens. An explanation of the mode of plastic flow in pure torsion is suggested. 12 ref. (Q1, Q24, Cu)

858-Q. Effect of Ferrite Grain Structure Upon Impact Properties of 0.80 Pct. Carbon Spheroidite. M. Baeyertz, W. F. Craig, Jr., and E. S. Bumps. *Journal of Metals,* v. 188, Dec. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1465-1471.

Object was to investigate further the dependence of ductility upon structure; specifically, it was desired to ascertain whether ferrite grain structure, including both shape and size of the grains, can account for the consistently good performance of tempered martensite in the notched bar impact test. Spheroidite obtained by tempering martensite, with its small, needle-shaped grains, was compared with spheroidite from pearlite. Nickel was chosen as the alloying element to assure martensitic structure throughout upon quenching the impact specimens. Photomicrographs illustrate spheroidite structures as formed and at fracture locations. (Q6, M27, ST)

859-Q. Alloys of Copper and Iron. Cyril Stanley Smith and Earl W. Palmer. *Journal of Metals,* v. 188, Dec. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1486-1499.

Studies were made of the mechanical and other properties of alloys over the entire composition range from pure Cu to pure Fe. Although the two-phase alloys have poor corrosion resistance unless protected, the composition in the vicinity of 65% Cu possesses an excellent combination of strength and electrical conductivity in the form of cold drawn wire. The alloys near 5-10% Cu have the highest strengths and are the most susceptible to improvement by age hardening. 16 ref. (Q general, P general, M24, Cu, Fe)

860-Q. Structure of a Deformed Metallic Grain. J. A. Ramsey. *Nature,* v. 166, Nov. 18, 1950, p. 867-868.

Experiments on polycrystalline Zn indicate that upon deformation, the grains break down into a number of fragments. The degree of perfection, and probably the size, of the fragments increase with increasing temperature of deformation. (Q24, Zn)

861-Q. Breakage of Castings in Transit. J. Dearden. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Oct. 1950, p. 559-561.

Remedies include improved design and packing, also relief of residual stresses. (Q25, CI)

862-Q. The Variation of the Coefficient of Static Friction With the Rate of Application of the Tangential Force. R. C. Parker, W. Farnworth, and R. Milne. *Institution of Mechanical Engineers, Proceedings* (Applied Mechanics Div.), v. 163, W.E.P. No. 59, 1950, p. 176-184; discussion, p. 184.

The coefficient was measured for a number of different materials under impact conditions. An analysis of conditions of impact, derived from collision between solid bodies, and from a suitable hydraulic system, showed the latter to be a more convenient and equally effective method of applying tangential force. Static friction was measured for rates of application of axial force up to 10^3 tons per sec. Under dry conditions, friction increased with rate of applied force, an effect more pronounced between a nonmetal and a metal than between metals. Lubrication with oil diminished variation of friction with rate of application of force for all combinations of materials tested. Data for steel vs. a nonmetallic material and for steel vs. bronze. (Q9, ST, Cu)

863-Q. Gear-Tooth Stresses at High Speed. W. A. Tuplin. *Institution of Mechanical Engineers, Proceedings* (Applied Mechanics Div.), v. 163, W.E.P. No. 59, 1950, p. 162-167; discussion, p. 167-175.

Theoretical, mathematical discussion and analysis. Fatigue data suggest that the number of stress cycles required to cause failure of a given material under any particular stress is independent of the time-rate of repetition of stress. It should therefore be permissible to stress any gear, regardless of its speed, up to the fatigue limit for its material. However, this is not the case. It is believed that errors of pitch and profile in gear teeth may cause actual stresses to be higher than theoretical. High loads may also be induced by operation in a condition approaching that of resonance with some type of vibration. (Q7, Q25, S21)

864-Q. Effect of Type of Bonds on Mechanical Properties of Crystalline Substances. (In German.) Ludwig Graf. *Zeitschrift für Metallkunde,* v. 41, Sept. 1950, p. 286-293.

The behavior of heteropolar, homopolar, and metallic bonds towards lattice translation was investigated. Lattice translation is explained as a composite process of dislocations of atoms, and movement of those dislocations followed by their dissolution. Effects on lattice structures. 29 ref. (Q24, M26)

865-Q. Experimental Determination of Effective Depth of Penetration in Radiographic Stress Determinations. (In German.) Alfred Schaal. *Zeitschrift für Metallkunde,* v. 41, Sept. 1950, p. 293-295.

Cobalt radiation was used to determine above for Fe, Al, and Cu. A formula applicable to all metals is presented. (Q25, S19, Fe, Al, Cu)

866-Q. Determination From Ludwik Hardness of the Primary Deviation From Hooke's Linear Relationship. (In German.) Rudolf Böklen. *Zeitschrift für Metallkunde,* v. 41, Sept. 1950, p. 295-297.

Shows that the cone test can be used to determine the tensile stress of metals. Experiments with malleable, quasi-isotropic ferrous and nonferrous metals show that this method can be used to determine yield points between 0.01 and 0.02. (Q27)

867-Q. The Problem of Determining the Deforming Properties of Aluminum Alloy Sheets. (In German.) Erich Mohr. *Zeitschrift für Metallkunde,* v. 41, Sept. 1950, p. 303-307.

Deforming properties of Al-Cu-Mg alloys were determined by means of fatigue-bending tests with the sheets under tensile stress in order to correlate chemical composition and cold work hardening with grain size and drawing properties. Special attention is paid to the importance of the sum Mg + Fe + Si on deformability. Shows that determining cold work-hardening curves is an additional method for evaluation of the drawing properties of soft annealed sheets of heterogeneous structure. (Q24, Al)

868-Q. The Temperature Dependence of Fatigue Strength and the Creep-Stress Resistance of Different Light-Metal Sintered and Cast Alloys. (In German.) Karl Wellinger, Ernst Keil, and Gustav Stähli. *Zeitschrift für Metallkunde,* v. 41, Sept. 1950, p. 309-313.

Tests made up to 300° C. showed that the annealed highly alloyed sintered alloys are much more sensitive to temperatures between 20 and 200° C. than the unannealed low-alloy metals. The latter, as well as cast alloys, were found to have satisfactory fatigue strength at elevated temperatures. At 200-250° C., creep-stress resistance was lower than fatigue strength. (Q3, Q7, Al)

869-Q. The Local Strength Properties of Extruded Shapes. I. (In German.) H. Kostron. *Metall,* v. 4, Nov. 1950, p. 451-458.

Extensive microtensile test results on seven typical extruded shapes of the Al-Cu-Mg alloy "Bondur 17/11". Diagrams show locations of test coupons, a large number being obtained from each shape. It was found that the difference in the tensile properties of transverse

and longitudinal bars is not quite as great as that calculated theoretically. (Q27, Al)

870-Q. Effect of Structural Inhomogeneities on the High-Temperature Deformability of Magnesium-Aluminum Alloys. (In German.) W. Lott. *Metall,* v. 4, Nov. 1950, p. 458-462.

Shows that the Mn included in Mg-Al alloys to increase corrosion resistance and to refine the melt also has a recrystallization-retarding effect. Mn is less soluble in Mg-Al alloys (6-7% Al) than was formerly assumed. There seems to be no improvement of working properties due to reduced Mn contents in the range of 0.1-0.3%. Nonmetallic, especially oxide, impurities greatly reduce the working properties of this alloy. 11 ref. (Q24, Mg)

871-Q. Relaxation Absorption of Elastic Oscillation in β-Brass Near the Curie Point. (In Russian.) P. E. Stepanov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Sept. 11, 1950, p. 217-220.

Theoretical, mathematical analysis. (Q21, Cu)

872-Q. Application of Alloy Steels to High-Temperature Steam Turbine Service. W. L. Fleishmann. *Blast Furnace and Steel Plant,* v. 38, Oct. 1950, p. 1183-1186.

Results of creep and rupture tests. Photomicrographs of fractured surfaces. (To be continued.) (Q3, Q4, T25, AY, SG-h)

873-Q. Study of Deformation at High Strain Rates Using High-Speed Motion Pictures. Herbert I. Fusfeld and Josephine Carr Feder. *ASTM Bulletin,* Dec. 1950, p. 75-79; discussion, p. 79.

Previously abstracted from *American Society for Testing Materials,* Preprint 42, 1950. See item 475-Q. (Q27)

874-Q. Plastic Biaxial Stress-Strain Relations for Alcoa 24S-T Subjected to Variable-Stress Ratios. Joseph Marin and B. J. Kotalik. *Journal of Applied Mechanics,* v. 17 *(Transactions of the American Society of Mechanical Engineers,* v. 72), Dec. 1950, p. 372-376.

Stress-strain relations for both constant and variable-stress ratios. Compares actual and theoretically predicted values of biaxial yield, ultimate and fracture strengths, and biaxial ductility. Various ratios of biaxial tensile stresses were investigated by subjecting tubular specimens to axial tension and internal pressure. Results showed that yield-strength values agree best with the distortion-energy theory. (Q27, Al)

875-Q. Three-Dimensional Photoelasticity. A. J. Durelli and R. L. Lake. *Machine Design,* v. 22, Dec. 1950, p. 122-125.

New creeping method which overcomes limitations of conventional freezing technique. Effect of time on photo-elastic fringe patterns under constant load. Shows how creep behavior of plastics is being utilized in a new method for study of stress distribution. (Q25)

876-Q. A Research Into the Relation Between Tensile Tests and the Deep-Drawing Properties of Metals. Claude Arbel. *Sheet Metal Industries,* v. 27, Nov.-Dec. 1950, p. 921-926.

See abstract of original in *Revue de Metallurgie,* item 490-Q, 1950, and condensed version in *Engineers' Digest,* item 716-Q. (Q27, Q23, Cu, Al, SS)

877-Q. The Testing of Metallic Abrasives. R. V. Riley, J. R. Park, and K. Southwick. *Sheet Metal Industries,* v. 27, Nov.-Dec. 1950, p. 955-967.

Applications, essential properties, types and compositions, determination of mechanical properties, microscopic examination, grading, and performance tests. (Q general, L10, S21)

878-Q. Discussion on the Paper—"Mechanical Properties of Low-Carbon, Low-Alloy Steels Containing Boron", by W. E. Bardgett and L. Reeve. *Journal of the Iron and Steel Institute,* v. 166, Nov. 1950, p. 193-199.

Above paper was published in the Nov. 1949 issue. Includes authors' replies. (Q general, AY)

879-Q. Mechanical Twinning in White Tin. R. Clark, G. B. Craig, and B. Chalmers. *Acta Crystallographica,* v. 3, Nov. 1950, p. 479.

Results of experiments conducted to clarify discrepancies among work of other investigators. (Q24, Sn)

SECTION R

CORROSION

1R. Corrosion Fatigue Cracking in Steam Piping. *Combustion,* v. 21, Dec. 1949, p. 57-58.

Causes of corrosion fatigue cracking in a number of British power stations. (R1, R4)

2R. Caustic Soda Versus Construction Materials. *Chemical Engineering,* v. 56, Dec. 1949, p. 213-214, 216, 218, 220.

Part I of a symposium in which a representative group of construction materials are evaluated for services involving caustic soda. Includes "Chlorimet", Walter A. Luce; "Worthite", W. E. Pratt; "Lead", Kempton H. Roll; and "Glass Linings", S. W. McCann. (R5)

3R. Corrosion Inhibitors for Steel. W. G. Palmer. *Journal of the Iron and Steel Institute,* v. 163, Dec. 1949, p. 421-431.

Experimental results show that many inhibitors, added to water or chloride solution in amounts insufficient to completely stop attack, produce localized attack, which is more intense than the corrosion in the absence of an inhibitor. It is believed that the attack is caused by formation of blister-like membranes over the sensitive points, which prevent access of inhibitor to the places where it is required. By using suitable mixtures of phosphate and chromate (or phosphate and persulfate) the danger can be avoided. (R10, ST)

4R. On the Mechanism of Oxidation of Nickel-Platinum Alloys. O. Kubaschewski and Ortrud Von Goldbeck. *Journal of the Institute of Metals,* v. 76, Nov. 1949, p. 255-267.

The mechanism of oxidation of binary alloys at high temperatures on the basis of measurements of the rate, between 600 and 1100° C., of Ni-Pt alloys containing 0-90 at.-% Pt, and the theory of C. Wagner. Results are expressed in terms of a "corrosion constant" which is the ratio of the square of the decrease in thickness of the metal layer to the time. Observations suggest that a diffusion process within the oxide layer determines the rate of oxidation. Conclusions may be generally applicable to other similar alloys. 24 ref. (R2, Ni, Pt)

5R. Corrosion-Erosion of Boiler Feed Pumps and Regulating Valves at Marysville, Second Test Program. J. M. Decker, H. A. Wagner, and J. C. Marsh. *Transactions of the American Society of Mechanical Engineers,* v. 72, Jan. 1950, p. 19-24; discussion, p. 24-26.

Corrosion-erosion tests at 320 and 385° F. indicated that at these temperatures, carbon steel is attacked to a lesser extent than at 250° F., whereas the reverse is true of the Cr-bearing steels. However, rate of attack of Cr steels is still only a fraction of that of carbon steels, so that use of alloy steels for boiler-feed-pump parts is warranted at the higher temperatures also. Of two bronzes tested "Navy M" appeared satisfactory up to 320° F.; a leaded bronze was unsatisfactory at all test temperatures. (R1, ST, Cu)

6R. Corrosion Testing of Buried Cables. T. J. Maitland. *Corrosion* (Technical Section), v. 6, Jan. 1950, p. 1-6; discussion, p. 6-8.

Methods used in connection with cables of various types of construction. Frequency of test points, method of selection, type of instruments employed, and method of analyzing results. A few typical examples illustrate results of corrosion tests and protective measures used to correct unsatisfactory conditions. (R8)

7R. Corrosion and Protection of Mine Hoist Ropes. F. L. LaQue. *Corrosion* (Technical Section), v. 6, Jan. 1950, p. 8-13.

Detailed investigation includes

photographs of cross sections of new "rope" (steel cable) and of rope after various amounts of use, showing wear and corrosion existing at various distances from the drum spout. Size-reduction, elongation, and breaking-strength variations along the rope from drum to cage are shown graphically. (R general, T28)

8R. Experience With Condenser Tubes at a Major Oil Refinery. Sj. Van Der Baan. *Corrosion* (Technical Section), v. 6, Jan. 1950, p. 14-18.

Experience with Al brass tubes at the Curacao Refinery of the Royal Dutch-Shell Group. Relative resistances of various compositions of Al brass. Corrosion by acidic condensate, impingement attack, dezincification, stress-corrosion cracking, fatigue, corrosion fatigue, and high-temperature attack at hot spots. (R4, T29, Cu)

9R. Preparation of Pipe Surface for Bitumen Coating During Reconditioning. O. C. Mudd. *Corrosion* (Technical Section), v. 6, Jan. 1950, p. 19-21; discussion, p. 21-22.

Discusses various methods from the point of view of effectiveness and cost. Most corrosion products and soil particles are inert in the absence of moisture and their retention, particularly when adherence is good, will not impair coating effectiveness if moisture is removed. Solution of diluted pipe primer is found effective in reducing moisture content of the residual foreign products on the pipe surface. (R8, L26)

10R. Corrosion of Wet Steel by Hydrogen Sulfide-Air Mixtures. D. C. Bond and G. A. Marsh. *Corrosion* (Technical Section), v. 6, Jan. 1950, p. 22-26; discussion, p. 26-28.

Experimental apparatus and procedure; and results. (R5, ST)

11R. The Cost of Corrosion to the United States. Herbert H. Uhlig. *Corrosion* (Technical Section), v. 6, Jan. 1950, p. 29-33.

Previously abstracted from *Chemical and Engineering News*. See item 6A-118, 1949. (R general, A4)

12R. Mechanism of Oxygen Reduction at an Iron Cathode. Walter A. Patrick and Herman B. Wagner. *Corrosion* (Technical Section), v. 6, Jan. 1950, p. 34-38.

Refers to previous articles in which H_2O_2 was assumed to be an intermediate in the corrosion reaction, particularly where ferrous materials are involved. Experiments with iron-amalgam cells. Inspection of data show that the greatest yields of peroxide were obtained in alkaline solutions with small current densities. 15 ref. (R1)

13R. Mitigation of Oil Field Corrosion. Paul L. Menaul. *World Oil*, v. 130, Jan. 1950, p. 152-154, 157.

Effect and cost of corrosion, underlying causes and methods for coping with the trouble. Use of aldehydes as inhibitors. (R10, T28)

14R. Joints and Clamps for Aluminum Conductors. Gordon B. Tebo. *Transactions of the American Institute of Electrical Engineers*, v. 67, Part II, 1948, p. 1145-1150; discussion, p. 1150.

Previously abstracted from *Electrical Engineering*. See item 6c-39, 1948. (R3, T1, Al)

15R. Heating Metal Specimens in Corrosion Tests. R. F. Thirsk, G. H. Botham, and G. A. Dummett. *Nature*, v. 164, Dec. 10, 1949, p. 1015.

In determining resistance of metals to boiling organic liquids, various methods of heating were tested. Greater solution rates and better reproducibility of results were obtained by induction heating. (R11)

16R. Marine Boiler Deterioration. I. G. Slater and N. L. Parr. *Institution of Mechanical Engineers, Proceedings*, v. 160, Dec. 1949, p. 341-350; discussion, p. 350-358.

See abstract of condensed version from *Engineer*, item 6B-47, 1949. (R4)

17R. Causes of Flue Gas Deposits and Corrosion in Modern Boiler Plants. W. F. Harlow. *Institution of Mechanical Engineers, Proceedings*, v. 160, Dec. 1949, p. 359-368; discussion, p. 369-379.

See abstract of condensed version in *Engineer*, item 6B-56, 1949. (R9)

18R. Original Remarks Concerning the Corrosion of Compressed-Gas Cylinders. (In French.) A. Pignot. *Chaleur & Industrie*, v. 30, Oct. 1949, p. 249-254.

Failures resulting from internal corrosion. Respective merits of the various metals and alloys for this use. Effect of HCN in the gas and need for more thorough purification of city gas. (R9)

19R. Some Remarks on the Theory of Corrosion Resulting From Local Galvanic Action. (In German.) G. Masing. *Archiv für Metallkunde*, v. 3, Oct. 1949, p. 343-346.

A critical experimental study of the theories of differential aeration, based on Wickert's and Evans' theories. 16 ref. (R1)

20R. Recent Developments in the Electrochemistry of Metallic Surfaces. (In German.) K. Wickert. *Archiv für*

Metallkunde, v. 3, Oct. 1949, p. 346-353.

Surveys recent literature on chemical and electrochemical corrosion, and the various theories. 36 ref. (R1)

21R. Local Element Effect and the Solution of Iron. (In German.) F. Todt. *Archiv für Metallkunde,* v. 3, Oct. 1949, p. 353-354.

Wickert's criticism of Evans' theory of corrosion. Criticizes Wickert's test procedure and theory. (R1)

22R. Concerning the Primary Corrosion Process. (In German.) H. Brubitsch. *Archiv für Metallkunde,* v. 3, Nov. 1949, p. 394-396.

Because of deficiencies in the "local-element" theory of corrosion, an investigation was made to determine whether or not adsorption is the primary factor. Since adsorption-active spots on the metal surface were shown to be identical to local cathodes or anodes, the theory appears to be valid. (R1)

23R. Adsorption Balances for Investigation of Gas Corrosion of Metals and Alloys at High Temperatures. (In Russian.) I. A. Makolkin. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Oct. 1949, p. 1209-1212.

A newly designed adsorption balance, which is said to be much superior to that of Leontis and Rhines from the points of view of accuracy, sensitivity, and suitability for use at temperatures above 1000° C. (R9)

24R. Potential of Corroding Iron Structures and Protective Potential Under Conditions of Cathodic Protection. (In Russian.) I. N. Frantsevich and T. F. Franktsevich-Zabludovskaya. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 22, Aug. 1949, p. 793-800.

Potentials formed on stainless steel test specimens in a model gas duct were determined. Nature of processes inducing such potential is theoretically interpreted. (R10, SS)

25R. Passivation of Iron by Adsorption-Paint Coatings. (In Russian.) G. S. Koshurnikov. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 22, Aug. 1949, p. 809-811.

Investigation shows that chemically adsorbed layers passivate iron in acid media. Mechanism of passivation is postulated. Passivating effect may be increased by coating the layers with polymerizing lacquers. (R10, L26)

26R. Corrosion of Molybdenum-Bearing Stainless-Steel Weld Metals. Anton L. Schaeffler and R. David Thomas, Jr. *Welding Journal,* v. 29, Jan. 1950, p. 13S-24S; discussion, p. 24S-31S.

Eleven compositions of weld metal within the range of analysis of Types 316, 317, 318 (316Cb) and extra low carbon 316 were subjected to boiling 65% HNO_3 and to boiling $CuSO_4$-H_2SO_4. Each composition was tested in the as-welded state and in four conditions of heat treatment. Compositions were varied to produce microstructures with ferrite from 0 to 8%. 10 ref. (R5, K general, SS)

27R. Operating Problems in Gas Treating for Hydrogen Sulfide Removal. J. S. Connors and A. J. Miller. *Petroleum Processing,* v. 5, Jan. 1950, p. 29-31.

Many corrosion and other operating problems connected with the above are also experienced by petroleum refiners in treating refinery gases from sour crude. The modified iron-oxide process is being used in treating natural gas where the H_2S content is low. (R9, T29)

28R. Influence of Gas Adsorption on the Formation of Thin Films. (In French.) Marcel Perrot and Suzanne Argaix. *Comptes Rendus* (France) v. 229, Nov. 28, 1949, p. 1139-1142.

The spontaneous aging of thin films of silver was studied under reduced pressure in the presence of dry air, "laboratory air", and air saturated with water vapor. Variations of electrical resistance and of reflection factor with time and with pressure of the atmosphere are charted. (R2, P general, Ag)

29R. Crystallochemical Mechanism of Formation of Oxide Films on Iron at Room Temperature. (In Russian.) P. D. Dankov and N. A. Shishakov. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry), v. 23, Sept. 1949, p. 1031-1035.

Electron-diffraction investigation of individual stages of formation of oxide. Factors involved, such as amount of oxygen, pressure. (R2, M22, Fe)

30R. Intercrystalline Corrosion of Aluminum Alloys. 2. Alloys of the System Al-Zn-Mg. (In Russian.) A. I. Golubev. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry), v. 23, Sept. 1949, p. 1116-1126.

Corrosion resistance of the intermetallic compound $MgZn_2$ precipitating along the grain boundaries in alloys of the above system was investigated. A theory of corrosion cracking of these alloys is developed. (R2, Al)

31-R. The Corrosion of Steel and Its Protective Metallic Coatings. Allan B. Dove. *Wire and Wire Products,* v.

25, Jan. 1950, p. 29, 31-37, 88-91.
Theory and practice. 34 ref.
(R general, ST)

32-R. Caustic Soda Versus Construction Materials. *Chemical Engineering,* v. 57, Jan. 1950, p. 213-214, 216.
Part II of a symposium includes the following brief articles: "Rubber Linings", E. L. Lockman; "High-Silicon Iron", Walter A. Luce; "Stainless Steel", W. G. Renshaw; and "Cements", Raymond B. Seymour. Not recommended are: chemical stoneware (F. E. Herstein); aluminum (Ellis D. Verink, Jr.); and tantalum (Allan L. Percy). (R6)

33-R. The Electrochemical Behavior of Aluminum. I. In Solutions of Cerium Sulfate in Sulfuric Acid. J. V. Petrocelli. *Journal of the Electrochemical Society,* v. 97, Jan. 1950, p. 10-19.
Electrode potentials, weight-loss data, and polarization curves show that the reaction may be interpreted from an electrochemical point of view. The theory of "mixed potential" is suggested as a more generalized concept than the local cell idea for interpretation of the dissolution process. Probable mechanism for the dissolution and for the passive behavior of Al. 18 ref. (R1, Al)

34-R. Hydrogen Blistering Reported by Several Oil Companies. M. H. Bartz and C. E. Rawlins. *Proceedings, American Petroleum Institute* (Refining Div.), v. 29M (III), 1949, p. 145-160; discussion, p. 160-162.
Previously abstracted from *Petroleum Processing.* See item 6B-124, 1949. (R2, T28)

35-R. Hydrogenation Plant Steels. George A. Nelson. *Proceedings, American Petroleum Institute* (Refining Div.), v. 29M (III), 1949, p. 163-172; discussion, p. 172-174.
Graphs show limits of stability for C and Cr-Mo steels for various combinations of temperature and pressure. Operating limits of these steels in contact with hydrogen. Cladding was ineffective because of diffusion of hydrogen unless escape holes were provided. Effects of S and NH_3. (R9, T29, CN, AY)

36-R. Corrosion and Stress Factors in Piping Expansion-Joint Failures. H. F. Brown and W. M. Goryl. *Proceedings, American Petroleum Institute* (Refining Div.), v. 29M (III), 1949, p. 175-183; discussion, p. 183.
Types of corrosion encountered in stainless steel bellows-type piping expansion joints used in fluid catalytic cracking units, and methods of alleviating these failures by reducing stress levels through improved design. Theoretical considerations and mathematical analysis show that a satisfactory joint can be manufactured using a stabilized stainless steel (type 347). (R1, T29, SS)

37-R. Cathodic Protection Within an Oil Refinery. Derk Holsteyn. *Proceedings, American Petroleum Institute* (Refining Div.), v. 29M (III), 1949, p. 184-193; discussion, p. 193-195.
Cathodic protection has proved practical and economical on the bare network of pipe lines and storage-tank bottoms in an oil refinery. The units are designed with the aid of graphs; current densities are based on laboratory investigations and experiences. (R10, T29)

38-R. Graphite Anodes for Cathodic Protection. W. W. Palmquist. *Petroleum Engineer,* v. 22, Jan. 1950, p. D22-D24.
Describes use, including practical calculations. (R10, C)

39-R. Cathodic Protection and Its Application to the Iraq Pipelines. W. C. R. Whalley. *Journal of the Institute of Petroleum,* v. 35, Oct. 1949, p. 705-734.
Fundamental principles and details of equipment and procedures. Includes pipe coatings and their application. 21 ref. (R10)

40-R. From a Metallurgist's Notebook: Corrosion of Brass. H. H. Symonds. *Metal Industry,* v. 76, Jan. 6, 1950, p. 3-4.
Staining and apparent corrosion of isolated spots and small areas of copper-clad stair rails was encountered after bronzing and lacquering. The cladding was found to be 95% Cu, 5% Zn. Causes and remedies were determined on the basis of visual and microscopic examination and abrasion testing. (R2, L22, Cu)

41-R. Observations on Corrosion of Ferrous Metals. George D. Lain. *American Iron and Steel Institute,* "Technical Committee Activities", 1949, p. 102-114.
Atmospheric, bacterial, chemical, high-temperature, soil, and underwater corrosion and stray current electrolysis. (R general, Fe)

42-R. Causes and Control of White Rusting on Zinc Coated Sheets. G. R. Hoover and Arba Thomas. *American Iron and Steel Institute,* "Technical Committee Activities", 1949, p. 243-251.
Three ways, other than keeping the sheets dry, by which white rusting can be delayed or reduced in intensity. (R10, Zn)

43-R. Neutralization as a Means of Controlling Corrosion of Refinery Equipment. E. Q. Camp and Cecil Phillips. *Corrosion,* v. 6, Feb. 1950, p. 39-44; discussion, p. 44-46.

Methods employed in injecting NaOH, NH_3, and lime. Detailed results on the use of NH_3 in controlling corrosion of equipment in connection with distillation, cracking, gas absorption, debutanization, and steam systems. 29 ref. (R10, T29)

44-R. Causes of Corrosion in Airplanes and Methods of Prevention. N. H. Simpson. *Corrosion,* v. 6, Feb. 1950, p. 51-57.

The various types of corrosion which may occur on present types of aircraft and the latest methods of combating them. Importance of continuous research into corrosion problems of supersonic aircraft and missiles. Some of the possible reactions that may occur at high speeds between the atmosphere and the aircraft or missiles' exposed surfaces. (R3, T24)

45-R. The Use of Ammonia in Control of Vapor Zone Corrosion of Storage Tanks. F. T. Gardner, A. T. Clothier, and F. Coryell. *Corrosion,* v. 6, Feb. 1950, p. 58-65.

Previously abstracted from *Oil and Gas Journal.* See item 6B-175, 1949. (R10, ST)

46-R. Electrolysis Experiences on 115 KV High Pressure Oil Filled Pipe Type Cable Installation in New Orleans. Sidney E. Trouard. *Corrosion,* v. 6, Feb. 1950, p. 66-71.

Electrolysis profiles and diagrams showing details of cathodic-protection set-up. (R10, CN)

47-R. Prevention of Corrosion by Means Other Than Protective Coatings. F. L. LaQue. *Corrosion,* v. 6, Feb. 1950, p. 72-78.

Reviews the literature in control of environments; cathodic protection; design; and adjustment of composition. 91 ref. (R10)

48-R. Corrosion in the Stratosphere. *Industrial and Engineering Chemistry,* v. 42, Feb. 1950, p. 7A, 10A.

Numerous sources of corrosion of ferrous and nonferrous aircraft parts and surfaces. (R3, T24)

49-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 42, Feb. 1950, p. 73A-74A.

Recent developments in copper and copper-base alloys for corrosion applications. (R general, Cu, SG-g)

50-R. Hydraulic Cylinder Varies Spring Load in Fatigue Tester. *Product Engineering,* v. 21, Feb. 1950, p. 102-103.

Seamless steel pipe for use in oil-well drilling operations can be subjected to simulated service conditions in new corrosion-fatigue tester. (R1)

51-R. Investigation of Purity of Aluminum-Silicon Die Casting Alloys. Donald L. Colwell. *ASTM Bulletin,* Jan. 1950, p. 51-53.

Summarizes work on outdoor-exposure, salt-spray, and salt-solution-immersion tests on 5 and 12% Si aluminum die-casting alloys made since 1934. The results indicate that commercial grades are as corrosion resistant as high-purity grades. Conclusions are based on mechanical properties after exposure as well as depth of attack, weight loss, etc. (R11, Al)

52-R. From a Metallurgist's Notebook: Stress Corrosion Cracking. H. H. Symonds. *Metal Industry,* v. 76, Jan. 13, 1950, p. 33.

Results of metallurgical examination of three small brass bobbin shields showing varying degrees of cracking. (R1, Cu)

53-R. Some Cases of Protection of Aluminum Alloys and Their Assemblies and Their Resistance to the Atmosphere and to Sea Water. (In French.) Nicolas Beliaeff. *Métaux & Corrosion,* v. 24, Oct. 1949, p. 239-245.

A series of tests on Al-Cu-Mg alloys, in the form of experimental specimens, and in the form of riveted and bolted structures. Different types of protective methods and agents. (R general, Al)

54-R. Resistance to Corrosion of Hard Chromium Deposits. (In French.) P. Marisset. *Métaux & Corrosion,* v. 24, Nov. 1949, p. 247-260.

Comparison of corrosion resistance in different media has value only if conditions of tests are identical. Results of tests in 160 different media under different conditions. 18 ref. (R general, Cr)

55-R. Resistance to Corrosion of Duralumin Subjected to Different Surface Treatments. (In French.) L. J. G. Van Ewijk. *Métaux & Corrosion,* v. 24, Nov. 1949, p. 261-273.

Resistance to different media of specimens of duralumin (3.7-4.7% Cu, 0.4-1.0% Mg, 0.1-0.7% Si, 0.3-0.7% Mn, remainder Al) and of duralumin coated with 99.5% Al, 99.99% Al, and MgMnAl was investigated. (R general, Al)

56-R. Scattering and Multiple Tests in the Study of Corrosion. (In French.) L. Cavallaro and A. Indelli. *Revue de Métallurgie,* v. 46, Nov. 1949, p. 758-761.

Suitability of accelerated laboratory tests, involving scientifically scattered data, for corrosion studies; as contrasted with the more reliable, but time-consuming multiple-test technique. 15 ref. (R11)

57-R. Stress Corrosion of Light Metals. (In Dutch.) A. Hartman. *Metalen*, v. 4, Oct. 1949, p. 21-27; Nov. 1949, p. 39-47; Dec. 1949, p. 59-65.

Discusses the principal theoretical and experimental investigations on Al and Mg alloys reported in the literature. Testing methods; influence of alloying elements and of heat treatment. Nov. issue: Effects of different corrosive media on structural factors such as notches, of temperature, of crystal structure, of type of stress, and of heat treatment. Concluding installment: Theory of stress corrosion and its application to specific types of Al alloys. 52 ref. (R1, Al, Mg)

58-R. Surface Reaction Between Aluminum and Mercuric Chloride. (In Italian.) G. Bolognesi. *Alluminio*, v. 18, Sept.-Oct. 1949, p. 493-497.

The attack on Al of various degrees of purity of $HgCl_2$ was investigated by electrochemical means. The influence of Hg and HCl concentration on the process. 16 ref. (R6, Al)

59-R. Concerning the Passivating Action of Halide Ions on Iron in Concentrated Acid Solutions. (In Russian.) Z. A. Iofa and L. A. Medvedeva. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 69, Nov. 11, 1949, p. 213-216.

The inhibitive effect on dissolution of iron in acid solutions caused by a series of inorganic inhibitors, particularly those containing halide ions, was investigated. Results indicate that this effect is caused by formation of a surface layer consisting of an iron-halide compound (probably monomolecular). (R10, Fe)

60-R. Corrosion of Metals Under Action of Hydrocarbon Solutions of Iodine. (In Russian.) L. G. Gindin and M. V. Pavlova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 69, Nov. 21, 1949, p. 377-380.

Investigated for Cu, Pb, and Fe, using benzene and iso-octane solutions of iodine. (R5, Cu, Pb, Fe)

61-R. Rapid Determination of Susceptibility of Aluminum Alloys to Intercrystalline Corrosion. Hugh L. Logan. *Metal Progress*, v. 57, Feb. 1950, p. 211.

Technique requires only 30 min. or less. The specimen is made the anode in a normal NaCl solution. The cathode may be another piece of sheet of suitable size. After 15-30 min. the specimen is mounted for microscopic examination. (R2, Al)

62-R. Caustic Soda Versus Construction Materials. *Chemical Engineering*, v. 57, Feb. 1950, p. 215-216, 218, 220, 222.

Part III of a symposium in which a representative group of construction materials is evaluated for services involving caustic soda. Consists of the following: "Carbon and Graphite", R. O. Joslyn; "Silicones", W. J. Hargreaves and Frances Henson; "Iron and Steel", Albert W. Spitz; "Protective Coatings", Kenneth Tator; "Nickel, Nickel Alloys", W. Z. Friend; and "Durimet", Walter A. Luce. (R6, Fe, Ni, SS, C)

63-R. Parabolic Oxidation Rates of Metals. Walter J. Moore. *Journal of Chemical Physics*, v. 18, Feb. 1950, p. 231.

Rate of growth of thickness of an adherent oxide film on a metal often follows a parabolic law. Mechanism involved on the basis of correlation of literature data on parabolic rate constants for oxidation of Al, Fe, Zr, Ti, Ni, Cu, Co, Zn, and Be. (R2)

64-R. Galvanic Corrosion—What It Is and How It Can Be Avoided. Samuel B. Ashkinazy and James M. Joyce. *Materials & Methods*, v. 31, Feb. 1950, p. 49-53. Reprinted from *Sperry Engineering Review*.

Essential principles and practical preventive measures. (R1)

65-R. Stress-Corrosion Cracking in Welded Steel Structures. C. E. Pearson and R. N. Parkins. *Welding Research*, v. 3 (bound with *Transactions of the Institute of Welding*, v. 12), Dec. 1949, p. 95r-106r.

Investigation of a failure in a welded mild steel gas main carrying saturated crude coke-oven gas at 35-40° C. Cracking in coke-oven gas and in a boiling solution of 60% $Ca(NO_3)_2 + 3\%$ NH_4NO_3 was found to be sufficiently related so that the latter could be used as a test method. Effects of various factors. (R1, CN)

66-R. Surface Preparation; New Studies on the Oxidation of Pure Aluminium. G. Chaudron and P. J. G. Lacombe. *Metal Industry*, v. 76, Jan. 27, 1950, p. 69-70.

It was verified that high-purity Al reaches a potential of −1.625 volts in electrolytes containing Hg salts, a value close to that obtained on electropolishing in the absence of oxygen. (R2, L19, Al)

67-R. Aerobic Microbiological Corrosion of Water Pipes. I and II. (In English.) Erik Olsen and Waclaw Szybalski. *Acta Chemica Scandinavica*, v. 3, no. 9, 1949, p. 1094-1116.

Proposes theory that iron bacteria play a prominent part in the phe-

nomenon. Experiments made to test the theory. 33 ref. (R1, Fe)

68-R. Corrosion and Fouling. (In Russian.) N. I. Tarasov. *Priroda* (Nature), v. 38, Nov. 1949, p. 32-38.

Experimental investigation and literature data, particularly for ships and hydro-electric plants. Factors involved and methods of prevention. 26 ref. (R4)

69-R. Chipboard Eliminates Corrosive Etching on Steel Sheets. *Iron Age,* v. 165, Feb. 23, 1950, p. 85.

How etching normally occurring on the bottom sheet of stacks resting on wooden skids and pallets can be eliminated by use of a specially coated chipboard made from pulpboard used in making paper boxes. (R2, A5, ST)

70-R. Formation of Hair Line Cracks by Hydrogen Introduced Into Steel by Electrolysis. G. A. Geach. *Research,* v. 3, Feb. 1950, p. 98.

Experimental results. (R2, ST)

71-R. A Brief Survey of Stress and Corrosion Cracking in Brass. R. Stettler. *Sheet Metal Industries,* v. 27, Feb. 1950, p. 119-122.

Previously abstracted from original in *Pro-Metal.* See item 6C-60, 1949. (R1, Cu)

72-R. Corrosion Resistance of Analytical Weights. P. H. Bigg and F. H. Burch. *Nature,* v. 165, Feb. 4, 1950, p. 201.

Resistance of various types to laboratory atmosphere corrosion. Results show superiority of polished 25-20 Cr-Ni stainless steel. Plated weights were subject to considerable weight change. (R3, T8, SS)

73-R. The Corrosion of the Austenitic Stainless Steels. Part I. Types of Stainless Steel and Forms of Attack. G. T. Colegate. *Metallurgia,* v. 41, Jan. 1950, p. 147-150.

Effect of alloying elements in addition to Cr and Ni and of corrosive media with which the material may come into contact in service. (R general, SS)

74-R. The Corrosion of Metals. W. H. J. Vernon. *Journal of the Birmingham Metallurgical Society,* v. 29, Dec. 1949, p. 198-221.

Second of two lectures deals with preventive measures. Main classes are: Methods based on modification of design or procedure; methods based on modification of environment; methods based on modifications of metal; and methods based on protective coatings. 41 ref. (R10, L general)

75-R. The Tarnish-Resisting Silver Alloys. I. (In Japanese.) Keizaburo Miyata, Tomojiro Tottori, and Masazo Okamoto. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, May 1949, p. 40-42.

Effects of small quantities of various added elements on the tarnish resisting properties of Ag-base alloys were investigated by examining the degree of tarnishing produced when immersed in 0.1N Na_2S solution. The invisible films formed by heating these alloys in air or in controlled atmospheres of low pressure were found to be highly protective against tarnishing. Good results were obtained from binary Ag alloys containing Zn. (R2, Ag)

76-R. Intergranular Attack on Steel by Penetration of Molten Salt. (In Japanese.) M. Kawakami and K. Ogawa. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, July 1949, p. 36-39.

It was found that part of the molten salt diffuses into the steel, mainly at grain boundaries. Diffusion constants and their variations with temperature were determined. If the steel pieces are made cathodes and d.c. applied, the diffusion is prevented. (R2, R6, ST)

77-R. The Corrosion Mechanism of Cu and Its Alloys in Methanol. (In Japanese.) Tadayoshi Inui, Shiro Ogawa, and Toshizi Shirai. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, June 1949, p. 39-43.

Results of experimental investigation of the above. Pure methanol does not react, but after aging, a brownish black corrosion product is formed, identified by electron diffraction to be Cu_2O. A possible mechanism involving air oxidation of CH_3OH to CH_2O and HCOOH is outlined. (R7, Cu)

78-R. Studies on the Corrosion of Tin. IV. (In Japanese.) H. Endo and G. Yokoyama. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, June 1949, p. 43-47.

Results obtained with HCl, H_2SO_4, and HNO_3 vs. pure Sn and full ranges of its binary alloys with Al, Bi, Cd, Cu, Pb, Sb, and Zn. (R5, Sn)

79-R. The Corrosion of Impure Aluminum. I. Effect of Fe, Si and Cu. II. Effect of Mg, Mn, Sb, and Si. (In Japanese.) Ichiji Obinata and Seiichi Nishikawa. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Aug. 1949, p. 7-11.

Part I: Weight decreases and decreases in tensile strength and elon-

gation of Al containing varying amounts of Fe, Si, and Cu, upon immersion in 3% NaCl and 0.5 *N* HCl. In general, the effect of Cu is most harmful, followed by Fe and Si. Part II: Varying amounts of Mg, Mn, Sb, and Si were added to 98% Al containing 1.2% Fe and 0.8% Si to improve corrosion resistance in the same media, and also in 0.5 *N* NaOH. (R5, Al)

80-R. Porosity of Electrodeposited Metals. VI. Effect of Surface Structure of the Base Metal on the Permeability and Corrodibility of Deposits. N. Thon, Ling Yang, and Denis Kelemen. *Plating,* v. 37, Mar. 1950, p. 280-281, 284.

Deposits of the same metal, produced under otherwise identical conditions with unequal gas permeabilities of thin foils, generally corrode at unequal rates. Experimental data cover Ni and Fe deposits on stainless steel and Cu. (R2, Cu, Ni, Fe, SS)

81-R. Reaction of Iron With Organic Sulfur Compounds. Lyle A. Hamilton and W. W. Woods. *Industrial and Engineering Chemistry,* v. 42, Mar. 1950, p. 513-519.

Between 125 and 275° C., many organic compounds containing bivalent sulfur react with iron forming principally FeS. This reaction is common both to corrosion problems and to the action of sulfur compounds as extreme-pressure lubricant additives. Experiments on the reaction of iron and copper with several sulfur compounds. Two different corrosion processes appear to be involved; both of which terminate in the formation of the same FeS on the iron surface. (R7, Fe, Cu)

82-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 42, Mar. 1950, p. 83A-84A.

Use of Al, Cu, and their alloys for purposes requiring corrosion resistance. (R general, Al, Cu)

83-R. A Unified Mechanism of Passivity and Inhibition. Part II. R. B. Mears and R. H. Brown. *Journal of the Electrochemical Society,* v. 97, Mar. 1950, p. 75-82.

The inhibiting action of sodium chromate on localized corrosion of Al exposed to a NaCl solution is mainly the result of polarization of the local anodes. Polarization curves are of value in studying the mechanism of inhibitor action only if information on local cell behavior can be derived from them. Two indirect methods of estimating anodic and cathodic polarization curves of the local cells. The relationship of "reversible" potentials of metals as calculated from free-energy data and as measured in aqueous solutions. (R10, Al)

84-R. Corrosion and Its Causes. N. P. Peifer. *American Gas Association Monthly,* v. 32, Feb. 1950, p. 48-50, 58.

An elementary explanation of the various types. (R general)

85-R. What You Should Know About Corrosion of Ferrous Metals. George D. Lain. *Steel,* v. 126, Mar. 13, 1950, p. 101-102, 104.

See abstract from *American Iron and Steel Institute,* "Technical Committee Activities", 1949, item 41-R, 1950. (R general, Fe)

86-R. Investigation of Fretting Corrosion by Microscopic Observation. Douglas Godfrey. *National Advisory Committee for Aeronautics,* Technical Note 2039, Feb. 1950, 31 pages.

Glass, other noncorrosive materials, and metals were used. Convex surfaces were vibrated in contact with stationary flat surfaces. Fretting corrosion was caused by removal of finely divided and apparently virgin material due to inherent forces; its primary reaction is independent of vibratory motion or high sliding speeds. (R1)

87-R. Rapid Oxidation of Metals and Alloys in the Presence of Molybdenum Trioxide. J. L. Meijering and G. W. Rathenau. *Nature,* v. 165, Feb. 11, 1950, p. 240-241.

Temperature dependence of the influence of molybdenum trioxide on the oxidation of Al-Cu, Cu, Ag, and Al-Ag was studied. Rate of oxidation is markedly increased at such low temperatures (below 500° C.) that thermal decomposition can be disregarded. Surface conditions of the specimens were examined. (R2, R6, Al, Cu, Ag)

88-R. The Passivity of Metals. Part X. The Mechanism of Direct Dissolution of Ferric Oxide. M. J. Pryor and U. R. Evans. *Journal of the Chemical Society,* Dec. 1949, p. 3330-3336.

α-Ferric oxide was found to dissolve comparatively rapidly in HF or concentrated HCl, which readily form soluble complexes with ferric ions. In dilute solutions of HCl, H_2SO_4, or $HClO_4$, rate of dissolution falls off with time, and the resulting solutions contain ferrous iron. Mechanisms are suggested. (R10, Fe)

89-R. From a Metallurgist's Notebook: Intergranular Embrittlement. H. H. Symonds. *Metal Industry,* v. 76, Feb. 17, 1950, p. 127-128.

Investigation revealed that failure of small pieces of extruded copper on bending was due to intergranular

embrittlement resulting from treatment in a partially reducing atmosphere. (R2, Cu)

90-R. Copper Water Pipes; Result of B.N.F.M.R.A. Investigation on Corrosion. *Metal Industry,* v. 76, Feb. 17, 1950, p. 129-130.

Cause of occasional pitting was traced to carbonaceous films produced on the pipes during the manufacturing operation. Occurrence of these films can easily be prevented and the pitting thus avoided. (R2, Cu)

91-R. Electrochemical Studies of Protective Coatings on Metals. Part II. Resistance and Capacitance Measurements on Painted Steel Immersed in Sea Water. F. Wormwell and D. M. Brasher. *Journal of the Iron and Steel Institute,* v. 164, Feb. 1950, p. 141-148.

Changes in electrical properties showed good correlation with incidence and progress of corrosion of the underlying metal. The technique was used to investigate the influence of type of paint, of adverse conditions during painting, and of aeration and stirring. 17 ref. (R11, L26, ST)

92-R. The Costs of Corrosion and of Its Control. W. H. J. Vernon. *Engineering,* v. 169, Feb. 10, 1950, p. 160-161. A condensation.

A survey. (R general)

93-R. The Corrosion of Ferrous Metals. W. Westwood and R. I. Higgins. *Proceedings of the Technical Section, Paper Makers' Association of Great Britain & Ireland,* v. 29, Dec. 1948, p. 267-283; discussion, p. 283-301.

As encountered in the papermaking industry. Various types of corrosion and methods of protection. (R general, T29, Fe)

94-R. Mechanism of Action of Chromates During Corrosion of Plain and Stainless Steels in a Liquid Medium. (In French.) L. Cavallaro, A. Indelli, and A. Tani. *Revue de Métallurgie,* v. 46, Dec. 1949, p. 818-820; discussion, p. 820.

Mechanism of chromate inhibition. Results indicate that it is caused by intensification of the "barrier" effect due to "electrochemical inertia" of the transition metals. (R10, CN, SS)

95-R. Testing of Heat Resistant Alloys for Resistance to Corrosion by Combustion Gases. (In French.) P. Galmiche. *Revue de Métallurgie,* v. 46, Dec. 1949, p. 843-848.

Eight different alloy steels were tested; apparatus and procedure. Surface microstructures. Includes evaluation of effects of combustion-gas composition. (R9, AY, SG-gh)

96-R. Evaluation of the Effects of Rust on Sheet Steel. (In Italian.) V. Montoro and G. Canesi. *Metallurgia Italiana,* v. 41, Sept.-Oct. 1949, p. 225-228.

Method devised for determination of effects of rust on mechanical properties. Correlates decrease in the latter with decrease in thickness of unoxidized steel. (R2, ST)

97-R. The Application of Wagner's Scaling Theory of the Development of Scale-Resistant Alloys. (In German.) Karl Hauffe. *Metalloberfläche,* sec. A, v. 3, Dec. 1949, p. 213-214.

Wagner-Schottky's disorientation theory and how it can be used. 12 ref. (R2)

98-R. Forms of Corrosion on Light Metal Alloys. (In German.) P. Brenner. *Metalloberfläche,* sec. A, v. 4, Jan. 1950, p. 1-9.

Summary of different types of corrosion. 18 ref. (R1, R2, Al)

99-R. The Effect of Hydrogen on Corrosion Resistance, Anodic-Film Formation, and Workability of Aluminum-Magnesium Alloys. (In German.) H. Vosskühler. *Metall,* v. 4, Jan. 1950, p. 6-9.

Hydrogen in Al-rich alloys reduces their resistance to ordinary and stress-corrosion and results in decreased workability as indicated by hole-drilling tests. Includes photographs, tables, and graphs. (R1, Q23, Al)

100-R. Soil-Corrosion Studies, 1946: Ferrous Metals and Alloys. Irving A. Denison and Melvin Romanoff. *Journal of Research of the National Bureau of Standards,* v. 44, Jan. 1950, p. 47-76.

Measurements on a variety of wrought and cast ferrous materials after exposure to different soil conditions for periods up to 14 years. The steels ranged in composition from fractional percentages of Ni and Cr to the high concentrations typical of wholly austenitic steels. Magnitude and progress of corrosion with respect to weight loss and pitting are interpreted in relation to properties of the soils. Compares corrosion of plain wrought materials and cast iron. (R8, Fe, ST)

101-R. Durability Tests of Metalite Sandwich Construction. David G. Reid. *ASTM Bulletin,* Feb. 1950, p. 28-31.

Material consists basically of a relatively thick end-grain balsa core to which are bonded thin facings of high-strength aluminum alloy. Effects of accelerated exposure of edge-protected and unprotected specimens

to atmospheric and salt-spray on weight change, tensile strength, and fatigue strength. (R11, Al)

102-R. Correlation of Accelerated Weathering Machines. Roy W. Hill, George S. Cook, and William E. Moyer. *ASTM Bulletin,* Feb. 1950, p. 32-43.

Investigation made to correlate exposure results obtained from the Atlas Twin Arc Weatherometer with those obtained from the National Carbon X1A Accelerated Weathering Machine. Results agreed satisfactorily if the paint is dip-applied on primed metal panels and if certain other requirements are complied with. (R11, L26)

103-R. Kinetics of the Oxidation of Titanium. W. A. Alexander and L. M. Pidgeon. *Canadian Journal of Research,* v. 28, sec. B, Feb. 1950, p. 60-82.

Rates of oxidation of Ti powder and sintered bars were investigated from 25 to 550° C. at pressures of 2 and 20 cm. O_2. Shows that the oxidation process can be divided into two mechanisms; equations representing each. 43 ref. (R2, Ti)

104-R. Experience With Two Graphite Ground Beds in Dry Lakes. R. J. Emerson. *Corrosion,* v. 6, Mar. 1950, p. 79-81.

Cathodic corrosion prevention setups for pipe lines laid in dry lakes (salt beds) of highly corrosive character. (R10, ST)

105-R. Field and Laboratory Evaluation of Petroleum-Base Rust Preventives. E. L. Walters and R. G. Larsen. *Corrosion,* v. 6, Mar. 1950, p. 92-103; discussion, p. 103-104.

Evaluation in the light of field performance under conventional conditions of exposure. A statistical analysis of the influence of atmospheric environment, composition, and application variables upon the performance characteristics of both rust-preventive coatings and films. Field and laboratory behavior are correlated. (R11, Fe)

106-R. The National Association of Corrosion Engineers: Its Aims and Role in the Development of Experience in Combating Corrosion Problems. F. L. LaQue. *Corrosion,* v. 6, Mar. 1950, p. 88-91.

(R general)

107-R. Polarographic Study of Corrosion Phenomena. I. Introduction—Experimental Technique—Analysis and Interpretation of Polarograms. Pierre Van Rysselberghe, John M. McGee, Armin H. Gropp, Robert D. Williams, and Paul Delahay. *Corrosion,* v. 6, Mar. 1950, p. 105-113.

Previously abstracted from *Corrosion and Material Protection.* See item 11-95, 1948. (R11)

108-R. Condensation of First Interim Report on Ground Anode Test of Sub Committee TP-3—Anodes for Impressed Currents. *Corrosion,* v. 6, Mar. 1950, p. 114.

Installation procedure, operating data, and preliminary conclusions obtained from the first year of 4-yr. test. (R10)

109-R. Factors To Be Considered in Using Salt Spray Testing. Allen G. Gray. *Products Finishing,* v. 14, Mar. 1950, p. 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80.

(R11)

110-R. The Choice and Interpretation of Corrosion Tests. G. T. Colegate. *Sheet Metal Industries,* v. 27, Mar. 1950, p. 259-266.

(R11)

111-R. Corrosion Damage to Interior of Vessel Walls From Hydrogen Blistering Studied. *Petroleum Processing,* v. 5, Mar. 1950, p. 253-255.

Results of recent work on steel vessels by Standard Oil of Ohio, General Petroleum Corp. of Calif., Shell Development Co., and Continental Oil Co. (R2, T29, ST)

112-R. Stress-Corrosion Cracking of Mild Steel. Daniel Cubicciotti and William Boyer. *Welding Journal,* v. 29, Mar. 1950, p. 140s-145s.

Progress report on investigations of mild steel wires, covering effects of heat treatments and concentration, and composition of corroding liquid. Various nitrate-salt solutions were used. 10 ref. (R1, CN)

113-R. Stress-Corrosion in Radial-Flow Steam Turbines. G. H. Wray. *Engineering,* v. 169, Feb. 10, 1950, p. 141-143; Feb. 17, 1950, p. 169-171; Feb. 24, 1950, p. 217-218.

Investigation and research on cold work effects of rolling Cr-Ni-Mo steel dovetail blade fixtures during manufacture of blade rings for the Brush Ljungstrom double-rotation turbine. Laboratory-test and service failures. Effects of various heat treatments on structure. (R1, F23, N8, T25, AY)

114-R. From a Metallurgist's Notebook: Corrosion of Aluminium. H. H. Symonds. *Metal Industry,* v. 76, Feb. 24, 1950, p. 150, 152.

Results of examination of cast Al kettle spouts which showed corrosion

on the polished surfaces. The remedy is stated to be the production of sounder castings. (R general, Al)

115-R. Corrosion and Chemical Testing of Waters for Subsurface Injection. Part I. J. Wade Watkins. *Producers Monthly,* v. 14, Feb. 1950, p. 15-19.

Corrosion test methods and chemical analyses used in a study of plants that condition various surface waters and brines used for water flooding, brine disposal, and reservoir pressure maintenance. (To be continued.) (R4)

116-R. Concerning the Brittleness Caused by Alkalis. (In French and German.) Keel. *Zeitschrift für Schweisstechnik; Journal de la Soudure,* v. 40, Feb. 1950, p. 35-36.

Cracking of weld beads in steel caused by alkalis. (R5, K9, ST)

117-R. Preventing Dissimilar Metal Corrosion. Gilbert C. Close. *Industrial Finishing,* v. 26, Mar. 1950, p. 54, 56.

Procedures followed by Northrop Aircraft to prevent corrosion of Mg when used in an assembly with other metals, which depends to a great degree upon proper insulation to prevent dissimilar-metal contacts. (R1, Mg)

118-R. Rust and Stain Prevention With Water Displacing Fluids. *Electroplating and Metal Finishing,* v. 3, Mar. 1950, p. 253-255, 257, 265.

Techniques of use and applications. Action is based on the fact that certain surface-active materials will preferentially wet metal surfaces. (R10)

119-R. Pipe-Type Transmission Cable Employs Novel Corrosion Protection. *Electric Light and Power,* v. 28, Mar. 1950, p. 76-78.

Latest techniques of assembly, installation, operation, and protection against corrosion applied to 120-kv. pipe-type gas compression cable. For a salt-water river crossing, a "counterpoise" or control cable drains off excess potentials and acts as sacrificial corrosion metal. (R10)

120-R. Corrosion and Erosion of Pumps; Effects of Resistant Materials and Design. Norman Tetlow. *Chemical Age,* v. 62, Mar. 11, 1950, p. 373-374.

(R general, T29)

121-R. From a Metallurgist's Notebook: Corrosion of Chromium. H. H. Symonds. *Metal Industry,* v. 76, Mar. 3, 1950, p. 167-168.

Preservatives or brine added to meat passing through a food-processing machine were considered as a possible cause of the failure of the Cr plate on Al-bronze sleeves incorporated in the machine. (R5, T29, Cr)

122-R. From a Metallurgist's Notebook: Aluminium Corrosion. H. H. Symonds. *Metal Industry,* v. 76, Mar. 10, 1950, p. 189-190.

The possibility of corrosion of Al-alloy switch boxes by wall plaster was investigated. Recommendations for choice of alloy and surface treatment to prevent a slight tendency toward such corrosion. (R6, T1, Al)

123-R. Tentative Method of Testing Chemical Anti-Rust Agents and Inhibitors in the Laboratory. (In German.) W. Wiederholt and B. Thiede. *Metalloberfläche,* sec. A, v. 4, Feb. 1950, p. 25-28.

A systematic outline of the method, analogous to ASTM methods used in the U. S. (R10)

124-R. Attack on Sheet Steel by Hot Impregnating Oil and Its Prevention. (In German.) G. Schikorr. *Werkstoffe und Korrosion,* v. 1, Jan. 1950, p. 2-3.

Such oil can corrode iron considerably, because of acid components. However, corrosion can be almost wholly prevented by addition of 1% CaO. (R7, CN)

125-R. Effect of Heat Treating on the Corrosion Resistance of a Magnesium Alloy Containing 7% Al. (In German.) W. Bulian. *Werkstoffe und Korrosion,* v. 1, Jan. 1950, p. 10-12.

Test results in an 0.3% aqueous NaCl solution show that corrosion resistance increases as heterogeneity of the metal structure increases; hence, a homogenizing treatment lowers resistance to corrosion. 10 ref. (R5, J21, Mg)

126-R. Corrosive Behavior of Copper Alloyed Steels and Wulff and Uhlig's Passivity Theory. (In German.) K. Werny and R. Eschelbach. *Werkstoffe und Korrosion,* v. 1, Jan. 1950, p. 16-20.

The small amount of Cu (0.2-0.3%) required for maximum corrosion resistance indicates the formation of ionic solutions between Cu and Fe, with Cu and copper oxide forming protective films around the cathodic iron. According to Wulff and Uhlig's theory (interchange of electrons) the amount of Cu required for maximum protection would be 3.1%. (R10, AY)

127-R. Tubing Corrosion Due to Hydrogen Sulfide, Accelerated by Spent Acid. John G. Yapuncich. *Oil and Gas Journal,* v. 48, Apr. 1950, p. 68-69, 71, 90. Unusual condition of severe corrosion found in an 8900-ft. Wyoming

well, although similar wells in the field were little troubled with corrosion. Investigation indicated that spent acid diluted with formation water was left in the well for a considerably longer time than is customary. (R5, T28, CN)

128-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 42, Apr. 1950, p. 69A-70A.

Oxidation behavior of 18-8S stainless steel at 1800° F. in different oxidizing atmospheres obtained as a result of an ONR research program. (R2, SS)

129-R. Acid Corrosion Resistance of Tantalum, Columbium, Zirconium, and Titanium. Donald F. Taylor. *Industrial and Engineering Chemistry,* v. 42, Apr. 1950, p. 639.

Metals were tested in HCl, H_2SO_4, HNO_3, H_3PO_4, and $FeCl_3$ solutions of various concentrations. Results show Ta to be completely resistant to all solutions evaluated; Cb had high resistance to all except hot concentrated HCl and H_2SO_4; Zr and Ti were the least resistant. (R5, Ta, Cb, Zr, Ti)

130-R. Corrosion of Electro-Deposited Nickel; Resistance to Water Containing Dissolved Carbon Dioxide and Air. Leonard C. Flowers and James B. Kelley. *Industrial and Engineering Chemistry,* v. 42, Apr. 1950, p. 719-727.

Experimental investigation showed that Ni electrodeposits from baths containing salts of naphthalene disulfonic acids are dissolved rapidly and continuously at room temperature by water containing CO_2. Corrosion rates range from 25 to 96 mg. per sq. dm. per day. Electrodeposits from baths containing no brightening agent may be pitted under these conditions but do not corrode rapidly; neither does rolled sheet nickel. 14 ref. (R4, L17, Ni)

131-R. Corrosion Mitigation Discussed at United Nations Meet. W. Beck. *Corrosion* (News Section), v. 6, Apr. 1950, p. 19-21.

Reviews corrosion papers presented at Lake Success, Aug. 17-Sept. 6, 1949. (R general)

132-R. Oil Can Control Wear. R. E. Jeffrey, Jr. and J. M. Plantfeber. *Corrosion* (Technical Section), v. 6, Apr. 1950, p. 115-119.

A new development in engine lubricants shows that oil can control wear, where largely due to corrosion. As result of a thorough study of engine wear, the effect of the corrosive action of combustion products was found to be great, especially in the case of certain high-speed diesel-engine applications. Effect of sulfur content of fuel. The new engine lubricating oil reduces wear to as low as one-tenth of that usually found in certain diesel-engine applications. (R7, Q9, T25)

133-R. Field Experience With Corrosion Protection of Galvanized Steel Substation Structures. Siebert L. Miller. *Corrosion* (Technical Section), v. 6, Apr. 1950, p. 120-122.

Results of comparative "in-service" tests of several materials for substation structures and transmission line towers. (R3, T1, CN, Zn)

134-R. Corrosion of Steel Pipe by Chlorinated Seawater at Various Velocities. V. B. Volkening. *Corrosion* (Technical Section), v. 6, Apr. 1950, p. 123-127; discussion, p. 127-128.

Corrosion rates were obtained for six residual chlorine concentrations ranging from 0 to 4.0 ppm. at five seawater velocities of 0.1-6.4 ft. per sec. Pitting rates were accurately measured and compared with weight-loss corrosion data. Minimum effective dosage of chlorine was determined for elimination of marine fouling organisms. (R4, CN)

135-R. The Corrosion Products on Zinc Anodes Used Underground. E. A. Anderson. *Corrosion* (Technical Section), v. 6, Apr. 1950, p. 129-131; discussion, p. 131.

The presence of sulfates, such as gypsum, in the soil around Zn anodes used in the cathodic protection of pipelines has been observed to largely prevent the loss of current flow normally found in ordinary soils. Examination of the corrosion products on two anodes used in gypsum-bearing soil indicated the mechanism by which sulfates affect film resistance. (R10, Zn, Cn)

136-R. Field and Laboratory Tests of Sodium Chromates and Alkalies for Controlling Corrosion in Gas-Condensate Wells. C. K. Eilerts, R. V. Smith, F. G. Archer, L. M. Burman, Faye Greene, and H. C. Hamontre. *Corrosion* (Technical Section), v. 6, Apr. 1950, p. 131-133; discussion, p. 134-136. (Condensed.)

Previously abstracted from *World Oil.* See item 6B-111, 127, 138, 160, 178, and 186, 1949. (R10, ST)

137-R. Review of "Forum on Corrosion Research" Held at Washington, D. C., Nov. 9-10, 1949. J. J. Harwood and Fred Schulman. *Journal of the Electrochemical Society,* v. 97, Apr. 1950, p. 83C-91C.

10 references. (R general)

138-R. The Effect of Amines on the Electrode Potential of Mild Steel in Tap Water and Acid Solutions. Norman

Hackerman and J. D. Sudbury. *Journal of the Electrochemical Society,* v. 97, Apr. 1950, p. 109-116.

Potentials of SAE 1020 steel were measured in 1.0 *N* H_2SO_4 and tap water, each with added amines. Steady state potential was found to be a function of nature and concentration of the amine additives. Anodic and cathodic polarization measurements showed that both areas were affected by the inhibitor. The data are discussed in terms of a generalized theory of corrosion inhibition. 19 ref. (R10, CN)

139-R. Corrosion in Water-Flood Operations. F. A. Prange. *World Oil,* v. 130, Apr. 1950, p. 157-158, 160.

Types of corrosion, choice of alloys for these oil-field operations, and preventive measures.
(R general, T28, ST)

140-R. The Behaviour of Nickel-Chromium-Iron Alloys in Carbon-Bearing Gases in the Range 900°-1000° C. D. M. Dovey and I. Jenkins. *Journal of the Institute of Metals,* v. 76, Feb. 1950, p. 581-596.

Corrosion of Ni-Cr electrical-resistance alloys used at 900-1000° C. in partially burned manufactured gas was investigated. The corrosion, which is shown to be due to simultaneous carburization and oxidation of the alloy with rapid intergranular oxidation in depth, is typical of that known as "green rot". Order of attack was less in alloys containing Fe and the presence of approximately 2% Si was sufficient to suppress the corrosion completely. Possible factors governing the corrosion mechanism, and importance of the oxide layer as a barrier to carbon entry into the matrix. 14 ref. (R9, SG-q)

141-R. A Method for Assessing the Relative Corrosion Behaviour of Different Sea-Waters. T. Howard Rogers. *Journal of the Institute of Metals,* v. 76, Feb. 1950, p. 597-611.

Experience accumulated over many years has shown that the corrosive attack of sea water on Cu-base alloys varies considerably because of factors not easily revealed by ordinary chemical tests. Evaluates the corrosiveness of sea water by immersing a piece of Cu sheet of given area in the sample and estimating the amount of Cu dissolved in 22 hr. under standard conditions. (R4, Cu)

142-R. Domestic Copper Piping; Causes of Pitting Corrosion. *Metallurgia,* v. 41, Mar. 1950, p. 271-272.

Statement by British Non-Ferrous Metals Research Association for the guidance of manufacturers and users. Influence of character of water, effect of composition of tube, and effect of carbonaceous films. (R2, Cu)

143-R. Distribution of the Corrosion Process Along a Tube. (In Russian.) A. N. Frumkin. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry), v. 23, Dec. 1949, p. 1477-1482.

Distribution of corrosion in an endless tube filled with electrolyte having a fixed potential applied at the exit. Such a situation is exemplified by having a tube of one metal inserted into the wall of a large reservoir of another metal filled with the same electrolyte. Corrosion is thus studied as an anodic process on the wall of the tube. Formulas for determination of distribution of potential inside the tube are proposed and interpreted for different values of the variables. (R1)

144-R. Dissolving Rate and Solution Potential of Chromium. (In Russian.) Ya. V. Durdin and A. M. Markevich. *Zhurnal Obshchei Khimii* (Journal of General Chemistry), v. 19(81), Dec. 1949, p. 2131-2147.

Investigated in HCl and H_2SO_4 of various concentrations. The rate of solution in HCl (up to 8*N*) and in H_2SO_4 (up to 10*N*) is independent of intensity of stirring, indicating that the rate is not influenced by the diffusion process, as indicated by the high temperature coefficient of this rate. 12 ref. (R5, Cr)

145-R. Vertical Distribution of Photographically Active Particles, Precipitated From Metals by Atmospheric Corrosion. (In Russian.) I. L. Roikh. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 70, Jan. 11, 1950, p. 253-256.

Claims that certain of the above effects were obtained with Mg, Al, and Zn. Quantitative data are given for variations of this effect with surface condition of the samples. No explanation is given for the peculiar phenomena reported.
(R3, Mg, Al, Zn)

146-R. Action of Corrosion and Stress on 13% Cr Stainless Steel. H. H. Uhlig. *Metal Progress,* v. 57, Apr. 1950, p. 486-487.

Experiments which suggest that failure by cracking of stressed martensitic stainless steels exposed to a corrosive environment under stress may be best described as "hydrogen embrittlement". (R1, SS)

147-R. Plug Dezincification in Cartridge Brass. A. L. Simmons. *Metal Progress,* v. 57, Apr. 1950, p. 496-497.

Defect termed "measles" which was encountered immediately after pickling equipment was modernized by

substitution of spray equipment for vats. Experimental work indicated that the defect was plug dezincification. Causes may be steel, lead, or nonmetallic inclusions; and aeration of the solution. (R2, L12, Cu)

148-R. Corrosion: New Rust Preventives. William D. Robertson. *Chemical Engineering,* v. 57, Apr. 1950, p. 290, 292.

Use of Na and K molybdates or tungstates dissolved in small concentrations in circulating water to prevent corrosion of iron and steel. (R10, Fe)

149-R. Corrosion Problems in Gas Purification Units Employing MEA Solutions. F. C. Riesenfeld and C. L. Blohm. *Petroleum Refiner,* v. 29, Apr. 1950, p. 141-150.

Experimental work on corrosion of carbon, alloy, and stainless steels; and of aluminum and its alloys in contact with aqueous solutions of mono-ethanolamine or mixtures with diethylene glycol and water. Such solutions are used to remove CO_2 and H_2S from flue gas, hydrogen, and refinery and natural gases. (R7, T29, ST, Al)

150-R. Excerpts From Symposium on Testing Gear Oils. *SAE Journal,* v. 58, Apr. 1950, p. 46-53; discussion, p. 53. Based on "Performance Testing of Gear Lubricants", by W. J. Backoff, N. D. Williams, and K. Boldt; "Laboratory Wear Tests With Automotive Gear Lubricants", S. A. McKee and others; and "Moisture Corrosion Test for 2-105B Gear Lubricants", by T. P. Sands.

Includes illustrations of equipment; corrosion-test data; and discussion of Sands' paper by J. P. Stewart. (R11, Q9, ST)

151-R. Coupling Dissimilar Metals Adds to Corrosion Problems. Sidney K. Gally. *American Gas Journal,* v. 172, Apr. 1950, p. 21-23, 26.

Principles and recommendations for protection of copper-iron and copper-steel underground pipe joints. (R10, Cu, Fe)

152-R. The Influence of Stress Upon the Electrode Potential and Polarization of Iron and Steel in Acid Solution. M. T. Simnad and U. R. Evans. *Transactions of the Faraday Society,* v. 46, Mar. 1950, p. 175-186.

Experimental results show that in acid solution, where no oxide film can survive, the unpolarized potential of cold worked iron and steel is anodic in relation to the same material in the annealed condition. The same difference was observed in experiments where a cathodic current was applied; at any given current density, potential of annealed specimens is about 25 mV. nobler than that of the cold rolled material. Corrosion rate is affected by dissolved oxygen and by previous surface treatment. 25 ref. (R1, R5, Fe)

153-R. From a Metallurgist's Notebook: Sherardized Strip. H. H. Symonds. *Metal Industry,* v. 76, Mar. 31, 1950, p. 247.

Thickness of coating, bend tests, and copper sulfate tests were among the methods of examination used to determine the cause of failure in the surface of certain samples of the above. It was concluded that failure was due to corrosion by residual moisture. (R general, L16, Zn)

154-R. Die-Cast Zinc Alloy Conduit Fittings; Practical Experience of Their Use. L. A. J. Lodder. *Metal Industry,* v. 76, Mar. 31, 1950, p. 249-250.

Results of exposure tests indicate that corrosion between Zn-Al junctions is normally of far less consequence than that at steel-and-malleable iron junctions. (R1, Zn)

155-R. The Corrosion of the Austenitic Stainless Steels. Part II. Pitting and Intergranular Corrosion. G. T. Colegate. *Metallurgia,* v. 41, Mar. 1950, p. 259-262.

Mechanisms involved, effects of alloying additions, and preventive methods. (To be continued.) (R2, SS)

156-R. Electrical Current Resulting From the Supply of Oxygen to Galvanic Elements as a Measure of the Oxidation and Inception of Corrosion of Metals. (In German.) F. Tödt. *Werkstoffe und Korrosion,* v. 1, Feb. 1950, p. 49-51.

The amount of current generated by the oxidation of metals is a direct indication of their respective corrosive properties. 12 ref. (R1)

157-R. Evaluation of Rust Inhibitors for Medical Instruments. (In German.) K. Fischbeck and N. Muller. *Werkstoffe und Korrosion,* v. 1, Feb. 1950, p. 52-56.

Treatments of steel instruments with sodium carbonate and nitrite solutions are equally effective in reducing the susceptibility to rusting. (R10, T10, ST)

158-R. Experimental Research on the Reaction Between Water Vapor and Iron. (In German.) K. Wickert and H. Pilz. *Werkstoffe und Korrosion,* v. 1, Feb. 1950, p. 56-64.

Experiments made to determine the corrosive effect of steam at different temperatures on different types of iron and steel. (R4, Fe)

159-R. Corrosion of Intermetallic Compounds. (In German.) Karl Löhberg. *Zeitschrift für Metallkunde,* v. 41, Feb. 1950; p. 56-59.

Shows that water and water vapor decompose intermetallic compounds when their components have different electrochemical potentials and when they are subject to corrosion. Data are given for AlSb, Mg_3Sb_2, Mg_3Bi_2, Mg_2Sn, Ag_2Pb, and 50-50 alloys of some of these compounds with Al, Mg, Sb, Sn, and Pb. Methods of preventing corrosion. There seems to be no correlation between crystal structure or atomic dimensions and corrodibility.
(R1, M26, Al, Mg, Sb, Bi, Sn, Pb, Ag)

160-R. Anodic Oxidation of Ferrochromium in a Caustic Potash Solution. (In French.) Chu Yung-Chao. *Comptes Rendus* (France), v. 230, Jan. 30, 1950, p. 445-447.

Performance of a ferrochromium anode (66.5% Cr, 22.3% Fe, 11.2% C) over a wide range of concentrations of KOH was investigated. Relations between current density, anodic efficiency (% of theoretical yield of potassium chromate based on electrical power consumption), and concentration of the solution. Ranges of concentrations and current densities most suitable for formation of a ferric oxide coating. Compares results with those for caustic soda. Contrary to results reported by Thompson in 1924, anodic efficiency increased with temperature.
(R6, Cr, Fe)

161-R. Radioisotopes Aid Corrosion Research. Jack M. Swartout. *Petroleum Engineer,* v. 22, Apr. 1950, p. C31-C32.

Use at Corrosion Research Laboratory, University of Texas. (R11)

162-R. Corrosion Problems of the Chemical Corps. Jack Furrer. *Armed Forces Chemical Journal,* v. 3, Apr. 1950, p. 24-26.

A few specialized problems in corrosion of steels and Al alloys by chemical-warfare agents and prevention by coatings and other means. (R6, R7, L general, ST, Al)

163-R. Developments in Corrosion Prevention in West Texas. H. D. Murray and W. H Crenshaw. *Oil and Gas Journal,* v. 48, Apr. 27, 1950, p. 166-168.

Methods and materials.
(R general, T28)

164-R. Weathering of Some Aluminium Alloys. *Light Metals,* v. 13, Apr. 1950, p. 215-221.

Experimental and service behavior of 2S, 3S, 50S, and 51S alloys after long exposure to rural, industrial, and maritime atmospheres.
(R3, Al)

165-R. The Dissolution of Metals Over the Temperature Range 25° C. to −60° C. I. The Dissolution of Magnesium in Hydrochloric Acid-Methyl Alcohol-Water Solutions. A. B. Garrett and R. R. Cooper *Journal of Physical & Colloid Chemistry,* v. 54, Apr. 1950, p. 437-444.

Series of investigations is designed to show the general characteristics of the dissolution of metals in HCl from 25 to −60° C. From the data, order of reaction; rate of reaction at various stirring speeds and temperatures; and temperature coefficient of reaction rate (i.e., activation energy) are calculated.
(R5, Mg)

166-R. Orientation of a Polyfunctional Organic Molecule at a Steel Surface. Norman Hackerman and E. E. Glenn, Jr. *Journal of Physical & Colloid Chemistry,* v. 54, Apr. 1950, p. 497-505.

Electron-diffraction, surface-reflection investigation of the adsorption-desorption characteristics of a commercial corrosion inhibitor. It was found that adsorption of this inhibitor was more firm from the more dilute solutions within the range studied. Gradual fading of the arc pattern was noted. A possible mechanism for the phenomena observed is presented. 10 ref. (R10, P13, ST)

167-R. Extra Low Carbon Stainless Steel. Arba Thomas. *Corrosion* (News Section), v. 6, May 1950, p. 1.

Tendency of austenitic stainless steels to intergranular corrosion adjacent to welds. This inherent weakness can be solved by use of Cb or Ti-stabilized grades, but cost is greatly increased. Recommends use of extra-low-carbon Types 304 and 316. (R2, SS)

168-R. Corrosion of Metals by Insecticidal Solutions. George S. Cook and Nancye Dickinson. *Corrosion* (Technical Section), v. 6, May 1950, p. 137-139.

Comparative corrosion resistance of stainless steel, Cu, brass, Al, Mg alloys, Al alloys, cold-rolled steel, and galvanized iron when immersed in various insecticide solutions. Additional tests are suggested.
(R5, R7)

169-R. Potentials Set Up by Thermal Gradients in Iron Immersed in NaCl Solutions. Herbert H. Uhlig and Oscar F. Noss, Jr. *Corrosion* (Technical Section), v. 6, May 1950, p. 140-143.

Laboratory study of cells in which seamless steel tubing electrodes were

immersed in NaCl solutions, with one electrode at 100 and the other at 25° C. Results are of importance in connection with numerous common combinations found in industrial equipment. (R5, ST)

170-R. The Value of Backfill With Carbon and Graphite Anodes. J. P. Oliver and W. W. Palmquist. *Corrosion* (Technical Section), v. 6, May 1950, p. 147-150.

Inherent advantages of graphite and carbon anodes for cathodic protection are increased by the proper selection and use of backfill material. Recommends use of carbonaceous backfill. (R10)

171-R. The Installation and Economics of Placing Magnesium Anodes at Leaks Repaired on a Pipe Line. J. A. Holloway. *Corrosion* (Technical Section), v. 6, May 1950, p. 157-161. (R10, CN, Mg)

172-R. Summary of Discussion: Corrosion and Protection of Offshore Drilling Rigs. F. L. LaQue. *Corrosion* (Technical Section), v. 6, May 1950, p. 161-166.

Discussion at NACE's 5th annual conference, Cincinnati, Apr. 11-14, 1949, on corrosion by sea water. (R4)

173-R. Corrosion Control in the Cotton Valley Field. Alton J. Carroll. *World Oil,* v. 130, May 1950, p. 141-142, 144, 146.

Use of organic chemical corrosion inhibitors in preventing internal corrosion of oil field equipment. (R10, T28, ST)

174-R. High-Nickel Alloys Versus Sulphuric Acid. *Industrial Chemist and Chemical Manufacturer,* v. 25, Apr. 1950, p. 155-159.

Resistance of Monel and other high-Ni alloys to H_2SO_4 at various concentrations, temperatures, and degrees of aeration. (R5, Ni)

175-R. Stress Corrosion of Wrought Magnesium Base Alloys. Hugh L. Logan and Harold Hessing. *Journal of Research of the National Bureau of Standards,* v. 44, Mar. 1950, p. 233-243.

In order to determine effect of tensile stress on behavior of Mg alloys exposed to corrosive media, stress-corrosion tests were made on several of them at two outdoor-exposure sites, and in the laboratory by continuous immersion in a NaCl + K_2CrO_4 solution and by intermittent immersion in a dilute NaCl solution. Predictions of relative susceptibility to stress-corrosion from intermittent immersion laboratory tests in a 0.01% NaCl solution were in good agreement with results obtained from outdoor-exposure tests. (R1, Mg)

176-R. Soil-Corrosion Studies, 1946 and 1948: Copper Alloys, Lead, and Zinc. Irving A. Denison and Melvin Romanoff. *Journal of Research of the National Bureau of Standards,* v. 44, Mar. 1950, p. 259-289.

Results of measurements of the corrosion of Cu, Pb, and Zn, and of certain alloys of these metals, after exposure to different soil conditions for a maximum of 14 years. Magnitude and progress of corrosion with respect to weight loss and pitting are interpreted in relation to composition of the materials and properties of the soils. Comparative data for the corrosion of plain iron and steel, Cu, Pb, and Zn in typical soil environments. 10 ref. (R8, Cu, Pb, Zn)

177-R. Corrosion Resistance of Tantalum-Molybdenum Alloys. Walter C. Schumb, Schrade F. Radtke, and Michael B. Bever. *Industrial and Engineering Chemistry,* v. 42, May 1950, p. 826-829.

A series of alloys from 0 to 100 atomic % Ta in 10 atomic % steps was prepared by arc fusion of sintered compacts in an argon atmosphere. Resulting ingots were accurately cut, ground, and polished, and the surface of each sample estimated. Density, hardness, and other properties were determined. Corrosion resistance at 50° C. in solutions of concentrated HCl, HNO_3, and H_2SO_4 was determined. Ta-rich specimens were found to be unattacked, whereas the Mo-rich alloys were attacked at increasing rate in the order H_2SO_4, HCl, HNO_3. (R5, Ta, Mo)

178-R. Corrosion and Chemical Testing of Waters for Subsurface Injection. Parts II and III. (Concluded.) J. Wade Watkins. *Producers Monthly,* v. 14, Mar. 1950, p. 30-31; Apr. 1950, p. 25-31.

Determination of dissolved oxygen, free CO_2, pH value, total and dissolved Fe, alkalinity, and carbonate stability. 20 ref. (R4)

179-R. Preferred Orientation as a Factor in Intergranular Corrosion. W. D. Robertson. *Journal of Metals,* v. 188, May 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 790-791.

Several recent, independent studies, in combination with available X-ray data indicate that there may be a direct correlation between relative orientation of contiguous grains and susceptibility to intergranular

corrosion. Present note shows the nature of the correlation and suggests a few critical experiments by means of which the role of structure can be further clarified. (R2, M27)

180-R. Corrosion of Metals Underground. *Technical News Bulletin* (National Bureau of Standards), v. 34, Apr. 1950, p. 48-49; *Products Finishing,* v. 14, May 1950, p. 18, 20, 22, 24.

Based on recent papers by I. A. Denison and M. Romanoff, *Journal of Research of the National Bureau of Standards.* See items 100-R and 176-R, 1950. (R8, Cu, Pb, Zn)

181-R. The High Temperature Oxidation of Manganese. Raymond S. Gurnick and William M. Baldwin, Jr. *Transactions of American Society for Metals,* v. 42, 1950, p. 308-318.

Previously abstracted from Preprint. See item 6C-68, 1949. (R2, Mn)

182-R. An X-Ray Study of the Scale Formed on Iron Between 400 and 700° C. O. A. Tesche. *Transactions of American Society for Metals,* v. 42, 1950, p. 641-648; discussion, p. 648-652.

Previously abstracted from Preprint. See item 6B-147, 1949. (R2, M27, Fe)

183-R. Stress Corrosion in a Stainless Steel Compressor. Frank W. Davis. *Transactions of American Society for Metals,* v. 42, 1950, p. 1233-1250; discussion, p. 1251-1259.

Previously abstracted from Preprint. See item 6B-148, 1949. (R1, SS)

184-R. Corrosion Tests for Soluble Oil Dispersions. *Journal of the Institute of Petroleum,* v. 36, Mar. 1950, p. 148-163.

Comprehensive description of experimental work of Cutting Oil Panel of Standardization Sub-Committee No. 6 on Lubricants of the Institute of Petroleum. (R7, G21)

185-R. Structure of Stearic Acid Films on Copper. J. A. Spink. *Nature,* v. 165, Apr. 15, 1950, p. 612-613.

Brummage recently questioned the author's conclusions on the above. The criticism was based mainly on the observation that almost all long-chain compounds give similar electron-diffraction transmission patterns. Admits validity of this criticism, but shows that arc patterns obtained from rubbed films of stearic acid on stainless steel differ fundamentally from those of the acid heated on copper. (R2, Cu)

186-R. Corrosion of Cadmium and Zinc Coatings in Electrical Equipment. P. T. Gilbert and S. E. Hadden. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950 p. 41-49. (Preprint.)

Tests to determine behavior at room temperature and 60° in humid atmosphere in the presence and absence of various insulating materials. Results indicate that Cd should give adequate protection to steel components. (R3, T1, Cd, Zn, ST)

187-R. The Corrosion of the Austenitic Stainless Steels. Part III. Stress Corrosion. G. T. Colegate. *Metallurgia,* v. 41, Apr. 1950, p. 305-308.

Effects of stress corrosion, modified compositions, and atmospheric exposure. (R1, SS)

188-R. Corrosion Problems in Powder Metallurgy. (In German.) H. Grubitsch. *Werkstoffe und Korrosion,* v. 1, Mar. 1950, p. 89-93.

The corrosive properties of sintered bodies or powders differ from those of cast metals. Sintered articles are primarily corroded by galvanic action induced by cold working or by various external factors. Methods of reducing the rate of corrosion. 35 ref. (R1, H general)

189-R. Relationship of Metal Weight Loss to Absorption. (In German.) K. Wickert and J. Kroll. *Werkstoffe und Korrosion,* v. 1, Mar. 1950, p. 105.

Refers to weight-loss due to absorption. Experiments on CO_2 absorption by $Fe(OH)_3$ show that such absorption greatly affects the rate of corrosion of iron and steel. Tests were made with uncoated sheet iron and with sheet iron coated with "A-carbon" and with $Fe(OH)_3$ suspended in water containing CO_2 or O_2. (R5, Fe)

190-R. The Solubility of Iron in Hydrochloric Acid During the First Few Seconds. (In German.) K. Wickert, E. Böhnert, and H. Pilz. *Werkstoffe und Korrosion,* v. 1, Mar. 1950, p. 106-107.

Object of the study was to determine effects of an inhibitor (hexamethylene-tetramine) on the above. (R5, Fe)

191-R. Behavior of Materials in Contact With Steam at Temperatures Up to 600° C. (In German.) G. Bandel and H. J. Wiester. *Brennstoff-Warme-Kraft,* v. 1, Nov. 1949, p. 203-208.

Results indicate that although increased steam pressure and temperature reduce the relative fuel consumption of power plants, they also reduce life of the steam turbine. Tests were made to determine the high-temperature properties of highly alloyed austenitic steels. 16 ref. (R4, AY, SG-h)

192-R. Research on Corrosion of Electrodeposits by Different Solutions. (In Japanese.) Tadayoshi Inui. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Sept. 1949, p. 31-35.

The corrosion resistance of Ni, Cu, Cu-Ni, Zn, and Ag electrodeposits, also of solder and of phosphate coating, were determined in distilled water, NaCl, Bordeaux mixture, formaldehyde, DDT, formic acid, and sodium arsenite. (R5, Ni, Cu, Zn, Ag)

193-R. Studies on the Corrosion of Tin. V. (In Japanese.) H. Endo and G. Yokoyama. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Sept. 1949, p. 36-39.

Corrosion in H_3PO_4, CH_3COOH, NaOH, and some neutral-salt solutions. (R5, Sn)

194-R. — Studies on the Oxidation of Metals. II. Conditions for Formation of Powdered Oxide on the Surface of Iron. (In Japanese.) Yasumitsu Shimomura. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Oct. 1949, p. 16-17.

Conclusions derived in the first report were applied to new experiments and an empirical equation developed for conditions of formation of powdered iron oxide, based on heating temperature and time to formation. Also proposes a generalized equation applicable to all metals and alloys oxidized by the same mechanism as iron. (R2, Fe)

195-R. Corrosion of High-Cr Stainless Steel in an Acidic Mist. (In Japanese.) H. Endo, A. Itagaki, and G. Yokoyama. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Oct. 1949, p. 32-33.

Corrosion of 18, 25, and 30% Cr stainless steels in a mist of 10% H_2SO_4 and influence of small amounts of Ni, Mo, and Ni + Mo were investigated. (R5, SS)

196-R. The Tarnish-Resisting Silver Alloys. II. (In Japanese.) Masazo Okamoto and Tomojiro Tottori. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Oct. 1949, p. 34-36.

Ag alloys containing 1-6% Zn, Sn, Al, or Cd were investigated. Addition of 4-6% Sn or Zn was found to be very beneficial. Also, an oxide film rich in alumina formed by preferential oxidation of Al-containing Ag alloys was found to be corrosion resistant. Solid solubility of Be and Si in Ag was also determined. (R2, N12, Ag)

197-R. Corrosion of Diesel Cylinder Liners. F. N. Speller and F. L. LaQue. *Railway Mechanical and Electrical Engineer*, v. 124, May 1950, p. 258-261. A condensation.

Peculiar type of attack frequently encountered on the water side. Experiments indicate its cause to be cavitation-erosion caused by high-frequency vibration. However, an element of electrochemical corrosion apparently exists, since chromate inhibitors and use of austenitic cast iron (Ni-Resist) are somewhat effective in service, although not in laboratory testing where pure cavitation-erosion can be produced. Recommends practical steps for minimizing attack. Also discusses ordinary corrosion of diesel liners and its prevention. (R1, T25, ST, CI)

198-R. A Kinetic Study of Organic Inhibitors of the Reaction Between Magnesium and Acids. R. Hurst and M. A. Jermyn. *Journal of the Chemical Society*, Jan. 1950, p. 158-162.

Inhibition of metal-acid reactions by organic substances and simplified methods for studying the kinetics of such inhibitions. Dissolution of Mg by acids was found to be inhibited by organic amines. Various reaction-rate constants were determined. The relation between inhibitor concentration and degree of inhibition was found to be that expected for an adsorption process. Effectiveness of the inhibitor depends on steric factors—shape and size of its molecule regarded as adsorbed on the metal surface at an active point. (R10, Mg)

199-R. Corrosion Fatigue as an Intracrystalline Corrosion Effect. (In German.) Franz Lihl. *Metall*, v. 4, Apr. 1950, p. 130-131.

X-ray studies showed that the etching of ingot iron with acid results in formation of surface stresses which can be relieved, but not eliminated, by extended annealing followed by slow cooling. Mechanism is explained on the basis of test results. (R1, Fe)

200-R. Corrosion of Metals by Cracked Gasoline and Other Unsaturated Fuels. (In Russian.) L. G. Gindin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 71, Mar. 11, 1950, p. 361-363.

Study of the problem indicates that auto-oxidation is the cause of corrosion by gasoline. Data on corrosion of Zn, Cu, and Pb are charted Methods of prevention. (R7, Zn, Cu, Pb)

201-R. Study for Development of New Stabilized High Strength Aluminum Alloys, Final Report. E. H. Kinelski. *Cornell Aeronautical Laboratory,*

Report No. KA-496-M-4, June 1949, 64 pages.

Intergranular corrosion stabilization of 24S-type Al alloy. Reviews literature research and describes development of a micro solution-potential measuring technique, and experimental investigation of effect of various elements on electro-solution potential. 40 ref. (R2, R11, Al)

202-R. (Book) **Thermodynamics of Dilute Aqueous Solutions With Applications to Electrochemistry and Corrosion.** M. J. N. Pourbaix. 136 pages. 1949. Longmans, Green and Co., 55 Fifth Ave., New York. $5.50.

This monograph develops a general method for calculation of equilibrium conditions in reactions in dilute aqueous solutions. Methods whereby such equilibria can be expressed graphically are also explained and examples of their application given. Based on 1946 French edition. 130 ref. (R5)

203-R. Oxidation of Molybdenum in Air at 1100 to 1600° F. B. Lustman. *Metal Progress,* v. 57, May 1950, p. 629-630, 674.

Fundamental principles and actual behavior of Mo and its oxides at above temperatures in air. Experimental data on oxide production on heating for various times and at different temperatures. Amount of oxide which was strongly adherent was also determined. Indicates principles that will lead to a Mo-base alloy with a nonvolatile, impervious, refractory, and protective scale. (R2, Mo, SG-h)

204-R. Titanium: Good But Not Miraculous. Edmond C. Fetter. *Chemical Engineering,* v. 57, May 1950, p. 263-264.

Compares chemical corrosion resistance of Ti and that of Type 316 stainless steel. Ti and Type 316 are "neck-and-neck" as far as corrosion resistance goes—with one important exception. Ti is definitely superior in resistance to solutions of chlorine, chlorides and dilute HCl. (R general, Ti)

205-R. Design of Cathodic Protection for Open-Box Type Coolers. C. R. Draughon, Jr., and E. B. McNeil. *Petroleum Refiner,* v. 29, May 1950, p. 97-103.

Economic data show value of the installation. Pipe coils are carbon steel. (R10, CN)

206-R. Optical Studies of the Oxidation of Iron at Temperatures in the Range 20-265° C. A. B. Winterbottom. *Journal of the Iron and Steel Institute,* v. 165, May 1950, p. 9-22.

Optical investigations using an improved experimental technique. Results show that films up to 100-250 A. in thickness consist mainly of magnetite, or possibly γ-ferric oxide, while on films of greater thickness an outer layer of α-ferric oxide is formed. Rate of film growth appears to depend on crystal orientation, atmospheric moisture, and polish and cold work. The last retards film growth, possibly as a result of preferred orientation. The growth process does not appear to depend upon whether the film is formed on iron, or on ferrous alloys of the stainless type. 30 ref. (R2, Fe)

207-R. Corrosion Fatigue—The Influence of Disarrayed Metal. D. Whitwham. *Journal of the Iron and Steel Institute,* v. 165, May 1950, p. 72-79.

Experiments to determine whether a preliminary period of dry fatigue lengthens the normal corrosion-fatigue life by strain hardening, or shortens it by producing disarrayed metal which may be particularly susceptible to corrosion. With both cold-drawn and annealed mild steel wires, little or no change in corrosion-fatigue life was brought about by preliminary dry fatigue under the conditions tested. A metallographic study was also made of changes during air-fatigue and corrosion-fatigue processes. Relations between corrosion fatigue and other forms of failure. (R1, CN)

208-R. The Corrosion of the Austenitic Stainless Steels. (Concluded.) Part IV. Effect of Alloying Elements and of Corrosive Media. G. T. Colegate *Metallurgia,* v. 41, May 1950, p. 362-366.

(R general, SS)

209-R. Oxidation of Cemented Carbides. R. Kieffer and K. Kölbl. *Powder Metallurgy Bulletin,* v. 5, May 1950, p. 38-39.

Results of oxidation using Ti and W carbides. (R2, Ti, W, C-n)

210-R. Passivation of Metals. Rudolph Speiser, F. H. Beck, M. G. Fontana, and E. N. Lassettre. *Journal of Chemical Physics,* v. 18, May 1950, p. 772-773.

Theoretical explanation of phenomenon of passivation. (R10)

211-R. Theory of the Oxidation of Metals. N. Cabrera and N. F. Mott. *Reports on Progress in Physics,* v. 12, 1949, p. 163-184.

Recent theoretical and experimental work. The formation of stable films at low temperatures, the region of intermediate temperatures, the parabolic law, and adhesion and crystal form of an oxide film. 28 ref. (R2)

212-R. Use of Magnesium Anodes for the Protection of Pipe Lines. W. F. Higgins. *Magnesium Review and Abstracts,* v. 3, Dec. 1949, p. 99-119.

Theory and process of corrosion, theory of protection, requirements of a galvanic anode, magnesium as an anode, bacterial corrosion of iron pipes, practical implications of the method, pipe line surveys, electrical connections to pipe lines, and special anodes. Concerned for the most part with cast iron and steel pipe. (R10, Mg, CI, CN)

213-R. Report of Committee A-5 on Corrosion of Iron and Steel. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 110-112.

Previously abstracted from *American Society for Testing Materials,* Preprint No. 3. See item 6B-102, 1949. (R11, Fe, ST)

214-R. Effect of Weather on the Initial Corrosion Rate of Sheet Zinc. O. B. Ellis. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 152-167; discussion, p. 168-170.

Previously abstracted from *American Society for Testing Materials,* Preprint No. 10, 1949. (R3, Zn)

215-R. The Corrosion and Protection of Magnesium Alloys. Norman Bryce Harvey. *Journal of the Birmingham Metallurgical Society,* v. 30, Mar. 1950, p. 26-40.

Mechanism of corrosion. Effect of metal impurities, specific chemicals and solution, the atmosphere, and stress corrosion. Methods of testing corrosion susceptibility. Protection by alloying, and by surface treatment, and protection from galvanic corrosion. 15 ref. (R general, Mg)

216-R. The Bacterial Corrosion of Iron and Concrete. *Mining Journal* (London), v. 234, May 5, 1950, p. 450-451.

(R1, Fe)

217-R. Corrosion of Steel by Electrolytes Used in Chromium Plating Plants. (In German.) Lisel Koch. *Metalloberfläche,* sec. A, v. 4, May 1950, p. 65-68.

Results show that the steel is subject to intercrystalline corrosion, the electrolyte attacking mainly the cementite. Corrosion can be prevented by using low-carbon or carbon-free iron, using steel whose surface has been decarburized, or using steel that has been annealed to produce granular pearlite. These conclusions were experimentally tested and confirmed. (R2, L17, ST)

218-R. Corrosion Behavior in Very Dilute Aqueous Solutions. III. Corrosion at Temperatures Below 100° C. (In German.) L. W. Haase. *Werkstoffe und Korrosion,* v. 1, Apr. 1950, p. 129-132.

Presents results of experiments from 20 to 100° C. Data for carbon steel and cast iron. (R5, CN, CI)

219-R. Corrosion of Brass Tubes by River Water and Its Prevention. (In German.) J. Bünger. *Werkstoffe und Korrosion,* v. 1, Apr. 1950, p. 133-136.

Brass has a pronounced tendency to selective corrosion, especially to "dezincification" and cracking due to tensile stress. Conditions under which these phenomena occur. Two recrystallized, fine-grained brasses were not subject to selective corrosion, provided they have been properly heat treated and worked. (R2, R4, Cu)

220-R. The Rate of Corrosion of Metals in Acid Solutions Containing Depolarizers. Melvin Hochberg and Cecil V. King. *Journal of the Electrochemical Society,* v. 97, June 1950, p. 191-197.

The action of various quinones and dyes as corroding agents in acid solution on Cd, Sn, Pb, and Cu. Inhibition by reduction products or intermediate compounds, 13 ref. (R5, Cd, Sn, Pb, Cu)

221-R. A Polarographic Method for the Indirect Determination of Polarization Curves for Oxygen Reduction on Various Metals. I. Description of the Method—Case of Platinum. II. Application to Nine Common Metals. Paul Delahay. *Journal of the Electrochemical Society,* v. 97, June 1950, p. 198-212.

Deals with electrolytic reduction. The complete polarization curve was determined. Contributions of the two and four electron reduction processes, i. e., reductions of O_2 to H_2O_2 and N_2O are also calculated. Equilibrium conditions for the electrolytic reduction of oxygen are derived from thermodynamic data. Method is applied to Al, Zn, Mg, Ni, Fe, Ag, Cu, Sn, and Pb. 30 ref. (R11, Pt, EG-a)

222-R. Corrosive Environments and Methods of Mitigation in Producing Sour Crude. D. A. Shock and J. D. Sudbury. *Oil and Gas Journal,* v. 49, June 8, 1950, p. 73-74, 76.

Corrosion in well, aqueous hydrocarbon, and vapor environments encountered in handling crude. Corrosion of K monel, Inconel, and high Cr-Ni steel equipment. 15 ref. (R7, AY, Ni)

223-R. Design of Cathodic Protection For Open-Box-Type Coolers. C. R. Daughon, Jr., and E. B. McNeil. *Oil and Gas Journal,* v. 49, June 1, 1950, p. 76-78, 80, 82; *Petroleum Processing* v. 5, June 1950, p. 629-632.

Cathodic protection at the Baton Rouge refinery of Esso Standard Oil Co. retards or prevents waterside corrosion to such an extent that the alloy steel used at the present time may be replaced by carbon steel. (R10, AY, CN)

224-R. The Corrosion and Lining of Sulphate Digesters. T. T. Collins, Jr. *Paper Trade Journal,* v. 130, May 25, 1950, p. 32-34, 36, 38; June 1, 1950, p. 20-22.

Bibliography includes detailed abstracts of papers published through 1949. (R5, T29, ST)

225-R. Scale Deposit Prevention in Gas Lift Wells. R B. Walter. *World Oil,* v. 130, June 1950, p. 228, 230-231.

Use of down-the-hole assemblies of Zn and Cu to set up galvanic action to prevent scaling on the pump, tubing, and other units of the flow string. (R10, T28, Cu, Zn)

226-R. Corrosion on New Distillation Unit Processing Low Sulfur Crude. D. L. Burns. *Corrosion* (Technical Section), v. 6, June 1950, p. 169-177.

Nature of corrosion in the furnace tubes, factors involved, and remedial measures used. Crude charged averaged 0.20% sulfur content. Ammonia injection was used in neutralizing corrosive elements in the atmospheric tower overhead steam, and alloy steel tubes were substituted for carbon steel in the radiant section of the furnace. Corrosion rates for the carbon steel heater tubes are plotted vs. temperature and compared to those experienced when processing crude containing 1.5% sulfur. Marked effects which tube wall temperatures have on the corrosion rates. 10 ref. (R7, CN, AY)

227-R. Corrosion in Condensate and in High Pressure Sweet Oil Wells. R. C. Buchan. *Corrosion,* (Technical Section), v. 6, June 1950, p. 178-185.

Joint designs, thread lubricants, and tube installation practices. Use of low-carbon steel, 9% Ni steel, internally Ni-plated steel, and plastic-coated steel tubing. Various chemicals used as neutralizing agents, emulsifying and/or wetting agents, and other film-forming materials. Use of sodium silicate. Methods of determining corrosive conditions and efficiency of methods used to prevent corrosion. (R7, CN, AY)

228-R. The Role of Polarization in Electrochemical Corrosion. R. H. Brown, G. C. English, and R. D. Williams. *Corrosion* (Technical Section), v. 6, June 1950, p. 186-195.

Idealized schematic and actual polarization diagrams. Methods of correlating polarization with corrosion data. Method for obtaining contribution made by the polarization of each electrode reaction to the total polarization observed at an electrode and its implications in evaluating true over-voltage values. Relationship of IR drop at metal liquid interfaces to polarization diagrams and voltage concepts. 13 ref. (R1)

229-R. Corrosion in Sulfur Production; the Use of an Alloy Protective Coating. Norman Hackerman and D. A. Shock. *Corrosion* (Technical Section), v. 6, June 1950, p. 195-200.

Apparatus devised and installed in the field for measuring the rates of corrosion during various phases of sulfur production. Severe corrosion occurred only when water and molten sulphur were in contact with the steel surfaces together. Coatings containing Zn, Mg, and Al were found to be uniformly more corrosion resistant than galvanizing alone. (R6, L16, CN, ZN)

230-R. Interference From Forced Drainage. Robert Pope. *Corrosion* (Technical Section), v. 6, June 1950, p. 201-207.

A method for determining the interference which may be expected on a long structure due to forced drainage on a similar parallel structure is applied to 4-in. welded bare steel pipes. Effects of coatings, changes in soil resistivity, longitudinal conductivity and diameter of structures, distance to anode, and separation of structures. (R8, CN)

231-R. Steel, Heat and Water: Localized Formation of Magnetic Iron Oxide in Power Boilers. H. M. Rivers and W. M. Sonnett. *Blast Furnace and Steel Plant,* v. 38, June 1950, p. 694-696, 720, 722-723.

Pitting corrosion, attack on a heat-transfer surface by caustic in concentrating film, caustic attack under adherent deposits, hydrogen damage, effects of temperature, and corrosion fatigue. (R4, CN)

232-R. Protection of Steel in Off-Shore Structures. F. L. LaQue. *Drilling,* v. 11, June 1950, p. 29-31, 102-103.

Cathodic protection, Monel facing, and paint for various sections under water and underground. (R4, R8, CN)

233-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 42, June 1950, p. 63A-64A.

Theory, causes, and mechanism of fretting corrosion, and preventive measures. (R1)

234-R. Marine Boiler Deterioration. I. G. Slater and N. L. Parr. *Journal of the American Society of Naval Engineers,* v. 62, May 1950, p. 405-432. Reprinted from *Journal of the Institution of Mechanical Engineers,* Dec. 1949.

Surveys the several forms of boiler corrosion and deterioration encountered in marine practice. (R4, ST)

235-R. Corrosion Research in the Navy. Julius J. Harwood and Fred Schulman. *Journal of the American Society of Naval Engineers,* v. 62, May 1950, p. 463-485.

Previously abstracted from *Corrosion.* See item 6A-85, 1949. (R general, T22)

236-R. Cast 12% Chrome Steels Proved in Gas Wells. J. W. Juppenlatz. *Iron Age,* v. 165, June 22, 1950, p. 85-89.

Gas-well, Christmas-tree fittings made of cast 12% Cr alloy steel were found to be the ideal solution to severe corrosion encountered by the gas-condensate industry. Attack is by a mixture of organic acids plus carbonic acid. Conditions of high pressure, relatively high reservoir temperature, and turbulent flow causing erosion require an unusual combination of properties. Data for a variety of alloys, and typical corroded and eroded fittings. (R7, T28, SS)

237-R. Cathodic Protection Goes Offshore. E. P. Doremus and G. L. Doremus. *Oil and Gas Journal,* v. 49, June 22, 1950, p. 222, 225, 227-228.

Corrosion problems encountered on offshore oil-drilling rigs and platforms; also equipment for cathodic protection of steel in sea water. (R10, T28, ST)

238-R. Localized Formation of Magnetic Iron Oxide in Power Boilers. H. M. Rivers and W. M. Sonnett. *Combustion,* v. 21, June 1950, p. 41-46.

See abstract of "Steel, Heat and Water: Localized Formation of Magnetic Iron Oxide in Power Boilers," *Blast Furnace and Steel Plant,* item 231-R, 1950. (R4, CN)

239-R. Corrosion Mitigation Within Dehydrating Tanks. Ernest O. Kartinen. *Journal of Petroleum Technology,* v. 2, June 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 189, 1950, p. 175-178.

Experiences with corrosion prevention in the water-exposed areas of dehydrating tanks, and in some stock tanks. Results with various coatings were unsatisfactory, but cathodic protection proved to be quite successful and economically feasible. Need for quantitative information concerning effects of various factors is indicated. (R10, T29, CN)

240-R. Field Test of a Cathodic Protection Installation. H. A. Sweet. *Journal, American Water Works Association,* v. 42, June 1950, p. 551-552.

Test results designed to evaluate a system for protection of a 75,000-gal. water tank. Unprotected specimens of mild steel corroded four to seven times as fast as the protected ones. (R10, CN)

241-R. Experience With Cathodic Protection. James W. McAmis. *Journal, American Water Works Association,* v. 42, June 1950, p. 553-554.

Experiences with cathodic protection of water-system standpipes over a period of years. (R10, CN)

242-R. Caustic Danger Zone. A. A. Berk and W. F. Waldeck. *Chemical Engineering,* v. 57, June 1950, p. 235-236, 238.

Test which locates temperatures and concentrations where caustic soda is liable to crack stressed steel. Results reported were obtained by C. K. Stoddard some 10 years ago during a cooperative study of the cracking of stressed steel in hot caustic solutions. (R5, ST)

243-R. Results of Galvanic Corrosion Tests Involving 9% and 5% Nickel Steel Tubing Coupled to N-80 Casing. *Corrosion* (News Section), v. 6, July 1950, p. 1. (R11, AY)

244-R. Water Side Deterioration of Diesel Engine Cylinder Liners. F. N. Speller and F. L. LaQue. *Corrosion* (Technical Section), v. 6, July 1950, p. 209-215.

See abstract of "Corrosion of Diesel Cylinder Liners", *Railway Mechanical and Electrical Engineer,* item 197-R, 1950. (R1, T25, ST, CI)

245-R. Cathodic Protection of Fourteen Offshore Drilling Platforms. E. P. Doremus and G. L. Doremus. *Corrosion* (Technical Section), v. 6, July 1950, p. 216-224.

See abstract of "Cathodic Protection Goes Offshore," *Oil and Gas Journal,* item 237-R, 1950. (R10, T28, ST)

246-R. Cathodic Protection of an Active Ship in Sea Water. K. N. Barnard and G. L. Christie. *Corrosion*

(Technical Section), v. 6, July 1950, p. 232-234.

It is concluded that for a ship with an underwater area up to 10,000 sq. ft., a Mg protection system is practical and adequate. Costs are higher than those encountered where the anodes can be suspended at a distance from the steel being protected but still in the range where a saving would be realized over the life of a ship. (R10, T22, Mg)

247-R. New Controls for Tube-Film Deposit. *Power,* v. 94, July 1950, p. 98-101, 168, 170.

A black iron-oxide film is usually left on internal steel surfaces of boilers and tubing after acid cleaning. Experiments of effects of various materials and procedures for use after the normal acid-washing process. Nitrogen-displacement and water-displacement methods for reduction of deposit formation. Effects of various solutions on deposit formation and compositions of deposits. (R6, R4, ST)

248-R. Cures for Corrosion in Gas Condensate Wells. W. H. Stewart. *Petroleum Engineer,* v. 22, Reference Annual Issue, July 1950, p. B35, B38.

Recent work by various organizations including Battelle, U. S. Bureau of Mines, and University of Texas, sponsored by NGAA and NACE. (R7, ST)

249-R. Cathodic Protection on Texas Gas System. Robert J. Kuhn. *Petroleum Engineer,* v. 22, Reference Annual Issue, July 1950, p. D35-D36, D38-D40, D42, D44-D45.

Details of steps taken to prevent corrosion on the 840-mile line from Texas to Ohio. (R10, CN)

250-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 42, July 1950, p. 65A-66A.

Experiments which show that corrosion of plain low-carbon steel decreases and that of lead increases when wetting agents are added to dilute acid and basic solutions. (R5, CN, Pb)

251-R. Criteria for Cathodic Protection. *World Oil,* v. 131, July 1, 1950, p. 177-178.

Basic considerations in determination of proper protection for pipeline installations, and recommendations for proper protection through use of sacrificial anodes. The difference between costs with bare and protected or coated lines. (R10, ST)

252-R. A Bibliography on Cathodic Protection. F. A. Rohrman. *World Oil,* v. 131, July 1, 1950, p. 179-180, 182, 184, 186, 188, 190.

Lists 436 references by year of publication. Each is classified into one of five categories. (R10)

253-R. Report of Corrosion Committee. Sidney E. Trouard, chairman. *American Gas Association, Proceedings,* v. 31, 1949, p. 487-496.

Reports of subcommittees on causes of underground corrosion of metals, underground corrosion mitigation practices, instrumentation, and above-ground corrosion mitigation practice. Also includes paper, "Your Corrosion Problems Can't Be Solved on a Hit or Miss Basis", Pat H. Miller. (R general, R10)

254-R. Practical Cathodic Protection for Gas Distribution Systems. A. D. Simpson, Jr. *American Gas Association, Proceedings,* v. 31, 1949, p. 641-668.

Magnitude of corrosion leak experience on the Houston, Texas, system and their experience with cathodic protection for steel mains. Method of application and results obtained. (R10, CN)

255-R. Rectifiers and Galvanic Anodes for Cathodic Protection. A. L. Stegner. *American Gas Association, Proceedings,* v. 31, 1949, p. 669-673.

Advantages and disadvantages of each, based on generalities and experiences of engineers in the field. (R10, CN)

256-R. Report of Committee A-5 on Corrosion of Iron and Steel. *American Society for Testing Materials,* Preprint 3, 1950, 29 pages.

Includes miscellaneous committee recommendations; subcommittee reports on total immersion tests, on atmospheric exposure of black and galvanized sheets, wire and wire products, bare and metallic coated hardware, structural shapes, plates, bars, etc. Proposed revised tentative specifications for Zn-coated iron or steel sheets, coils, and cut lengths; also long terne iron or steel sheets, coils, and cut lengths. (R general, S22, Fe, ST)

257-R. Report of Committee B-6 on Die-Cast Metals and Alloys. *American Society for Testing Materials,* Preprint 12, 1950, 6 pages.

Includes extensive table of mechanical property data on Mg and Zn base alloys after 10 years atmospheric exposure at various locations. (R3, Q general, Mg, Zn)

258-R. Spray Testing With Natural and Synthetic Sea Water. Part II. A Study of Organic Coatings. Allen L. Alexander and Thomas P. May. *American Society for Testing Materials,* Preprint 26, 1950, 6 pages.

Simulated sea water is justified as a test medium in lieu of genuine

sea water for use in salt-spray testing. Results in the evaluation of organic coatings applied to ferrous surfaces. (R11, L26, Fe)

259-R. Coal-Ash Corrosion of Metals at Elevated Temperatures. C. T. Evans, Jr. *American Society for Testing Materials,* Preprint 55, 1950, 6 pages.

Cooperative study with Locomotive Development Committee of Bituminous Coal Research Assn. and Crucible Steel Co. of America on S-588 heat resisting alloy at 1350° F. Several other metals were also tested in the unstressed condition at 1000, 1350, and 1500° F. in contact with representative Ohio coal ash. Compares results with those obtained at Battelle Memorial Institute. (R7, AY, SG-h)

260-R. Stress-Corrosion Tests on Turbo-Supercharger Materials in the Products of Combustion of Leaded Gasoline. G. B. Wilkes, Jr. *American Society for Testing Materials,* Preprint 60, 1950, 13 pages.

Tests were made on 18 high-temperature alloys under both constant and cyclic temperature conditions. Acceleration of strain due to temperature cycling alone has a greater detrimental effect on strength. Speculations concerning the mechanism of stress-corrosion. (R1, SG-h)

261-R. Stress-Corrosion of Aluminium-7% Magnesium Alloy. E. C. W. Perryman and S. E. Hadden. *Journal of the Institute of Metals,* v. 77, May 1950, p. 207-235.

Determined after various aging treatments. Shows that there is close correlation between continuity of the grain-boundary β precipitate and the stress-corrosion susceptibility when sprayed with 3% NaCl solution, maximum susceptibility occurring when this precipitate is apparently quite continuous. Cold work before aging increases rate of precipitation and has a profound effect on stress-corrosion susceptibility. Internal strains set up during precipitation are shown to play no important part in the stress-corrosion mechanism. Small additions of Zn decrease rate of precipitation; however, they have little or no influence on stress-corrosion susceptibility. 26 ref. (R1, Al)

262-R. A Theory of the Mechanism of Stress-Corrosion in Aluminium-7% Magnesium Alloy. P. T. Gilbert and S. E. Hadden. *Journal of the Institute of Metals,* v. 77, May 1950, p. 237-261.

Theory based on experimental data postulates that, in stressed specimens, stress concentrations are built up at the tip of crevices formed by preferential attack of the β (Al_3Mg_2) phase. When the stress concentration at the tip of the most advanced crevice is sufficiently high, a sudden partial mechanical fracture between β and the solid solution leads to progress of the crack along the grain boundary. Rapid corrosion of the surfaces so exposed then occurs, with evolution of hydrogen. This intercrystalline attack quickly slows down as corrosion films reform on the electrodes and then proceeds by oxygen absorption. Eventually conditions leading to mechanical disruption are again built up. 15 ref. (R1, Al)

263-R. Relationship Between The Aging and Stress-Corrosion Properties of Aluminium-Zinc Alloys. E. C. W. Perryman and J. C. Blade. *Journal of the Institute of Metals,* v. 77, May 1950, p. 263-286.

Changes in microstructure which take place on aging an Al+10% Zn alloy at room temperature and at temperatures up to 125° C., correlated with stress-corrosion properties. Alloys containing 8 and 13% Zn were also examined. 21 ref. (R1, N7, Al)

264-R. Sulphur in Diesel Fuels. J. J. Broeze and A. Wilson. *Institution of Mechanical Engineers, Proceedings* (Automobile Div.), part 3, 1948-49, p. 128-136; discussion, p. 136-145.

Relevant physicochemical reactions of sulfur in the engine focus attention on the trioxide produced during combustion as the principal cause of ill effects. Among precautionary measures, certain beneficial rules of engine operation and design are proposed. Importance of metallurgical expedients such as chromium plating, and of use of special additive-type lubricants. 14 ref. (R7, Cr, CI)

265-R. Durability of Aluminium and Its Alloys. *Light Metals,* v. 13, Apr. 1950, p. 195-203; June 1950, p. 344-349.

Corrosion resistance and applications of Al as contrasted with those of the heavy metals. Part Two reviews the corrosion resistance of the various composition groups. (R general, Al)

266-R. Resistance to Caustic Soda of Different Materials. (In French.) A. Guitton. *Métaux & Corrosion,* v. 25, Mar. 1950, p. 84-86.

Corrosion resistances of alloy steels with a high content of Ni and Mo, Worthite, lead, enameled steel, rubber coatings, ferrosilicon, stainless steels, and cement. (R5, SG-g)

267-R. Tropicalization of Certain Materials and Parts Used in Construction of Electronic Tubes. (In French.) Georges Trebuchon. *Vide,* v. 5, Jan. 1950, p. 748-752; Mar. 1950, p. 777-780; May 1950, p. 814-818.

The "tropicalization"—increase in resistance to hot and humid conditions found in the tropics—of various metals, ceramics, and glasses. Results are presented in outline form. Jan. issue: The problem, and the status of present-day specifications. Mar. issue: Test procedures. May issue: Methods for protection of the various materials from conditions encountered in the tropics. Various types of coatings. 10 ref. (R3, L general, T1)

268-R. Research on Oxidation of Iron-Nickel Alloys at High Temperatures. (In French.) J. Bénard and J. Moreau. *Revue de Métallurgie,* v. 47, Apr. 1950, p. 317-323; discussion, p. 323.

A short resume of results of study on Fe-Ni alloys containing 5, 10, 20, and 30% Ni, and covering surface oxidation, internal oxidation, and kinetics of the oxidation. Research methods and apparatus. (R2, Fe)

269-R. Radiographic Proof of the Direct Oxidation of Platinum. (In German.) Rudolfo H. Busch. *Zeitschrift fur Naturforschung,* v. 5b, Apr.-May 1950, p. 130-132.

Slow formation of PtO_2 and Pt_3O_4 under different conditions. 16 ref. (R2, Pt)

270-R. Surface Layers on Magnesium. (In German.) F. Sauerwald. *Zeitschrift fur anorganische Chemie,* v. 262, May 1950, p. 69-78.

Magnesium alloys were anodized in salt baths and in aqueous solutions of the same salts in order to study the corrosion properties of the resulting surface films. (R general, L19, Mg)

271-R. The Scaling Behavior and the Mechanism of Oxidation of Heat and Scale Resistant Hard Alloys, Especially Those Based on Titanium Carbide. (In German.) R. Kieffer and F. Kölbl. *Zeitschrift für anorganische Chemie,* v. 262, May 1950, p. 229-247.

Reviews the literature and presents graphs, tables, photographs, and diagrams, showing properties of various hard metals and carbide alloys. 30 ref. (R2, Ti, W, C)

272-R. Nephelometric Testing. (In Italian.) G. Petracchi. *Metallurgia Italiana,* v. 42, Feb. 1950, p. 58-59.

Phenomenon of appearance of turbidity when ferrous materials are immersed in a clear liquid. Results of some experiments which indicate that degree of turbidity is an indicator of corrosion resistance, also of corrodibility vs. variation of internal energy due to magnetization and mechanical stressing. (R11, Fe)

273-R. Oxidation of Cobalt at High Temperatures. (In French.) Gabriel Valensi. *Metallurgia Italiana,* v. 42, Mar. 1950, p. 77-84.

Theoretical analysis of the problem is supplemented by a critical correlation of literature data and a description of some experimental work. While freshly exposed cobalt does not follow the Pilling and Bedworth ordinary law under 900° C., but a more complicated one; cobalt exposed to air, becoming covered by an invisible film, has a high-temperature oxidation rate which complies with the ordinary parabolic law. This same law is followed over 900° C., but there are two activation energies. (R2, Co)

274-R. The Effect of Oxygen in Gas Upon Gas Distribution Systems. Frank P. Mueller. *American Gas Association, Proceedings,* v. 31, 1949, p. 730-737.

Recent trends in gas production, natural gas-air mixtures, oxygen content of the latter and of liquefied petroleum gas-air mixtures, and corrosion of transmission lines. Results of questionnaire. 18 ref. (R9, T4, CN)

275-R. Corrosion Testing. R. N. Ride. *Plating Notes,* v. 2, Apr. 1950, p. 44-65.

Corrosion and corrosion resistance, the electrochemical theory of corrosion, general principles of corrosion testing, and various types of corrosion tests. Some new types of test equipment. 15 ref. (R11)

276-R. Sulfur in Your Crude Oil? It's Not How Much But Where. William C. Uhl. *Petroleum Processing,* v. 5, July 1950, p. 729.

Refinery corrosion from sweet crudes found to be caused by high sulfur content of light fractions. Greater use of alloy steels was found to be necessary. (R7, T28, AY)

277-R. Accelerated-Cavitation Research. W. J. Rheingans. *Transactions of the American Society of Mechanical Engineers,* v. 72, July 1950, p. 705-719; discussion, p. 719-724.

Cavitation-pitting tests were made with an accelerated-cavitation machine of the vibratory type. An attempt was made to solve some of the phenomena of cavitation by varying amplitude of vibration, depth of submergence of the test specimen, and by using alkalies, acids, and oils for the test liquid. Other tests were made to determine

relative resistance to pitting of recently developed materials. Miscellaneous ferrous and nonferrous metals and alloys, sprayed metals, also nonmetallic materials were tested. 12 ref. (R2)

278-R. From a Metallurgist's Notebook: Corroded Bronze. H. H. Symonds. *Metal Industry,* v. 76, June 30, 1950, p. 505-506.

During a relatively short period of service, considerable attack took place on the retaining strip in a thermostat compensating assembly. Investigation showed that the assemblies had come into contact with gases which were much too corrosive for the particular material. (R9, Cu)

279-R. The Effect of Dilute Sulfuric Acid on Magnetized Iron. I. (In German.) Georg Wagner. *Mitteilungen des Chemischen Forschungsinstitutes der Industrie Osterreichs,* v. 4, May 1950, p. 29-31.

F. Ehrenhaft's "magnetolysis" in which magnetized iron dissolved in dilute H_2SO_4 forms O_2 as well as H_2 was studied. Results confirm Ehrenhaft's findings that the evolved hydrogen actually contains about 0.40% O_2. 13 ref. (R5, Fe)

280-R. Stress Corrosion Cracking of Stainless Steels. I. Practical Experiences. II. An Investigation of the Suitability of the U-Bend Specimen. (In Swedish.) Helmer Nathorst. *Jernkontorets Annaler,* v. 134, No. 3, 1950, p. 97-133.

Part I: Summary of service failures reported in Sweden, divided into three groups on the basis of corrosing liquid; the first containing chlorides, the second alkalies, and the third miscellaneous agents. Among the latter are sodium hypochlorite, o-dichlorobenzene, and pine resin. Part II: Reproducibility of U-bend tests using 1.5-mm. specimens of 18-8 sheet immersed in hot concentrated $CaCl_2$ solutions. Fairly good reproducibility can be achieved if certain precautions are followed. Drawbacks of the test. 33 ref. (R1, SS)

281-R. Stress Corrosion of Brass. (In Dutch.) W. G. R. de Jager. *Metalen,* v. 4, Mar. 1950, p. 138-148; May 1950, p. 185-190.

Surveys current literature on the stress-corrosion cracking (season cracking) of brass. Standardization of an accelerated ammonia test to control susceptibility to this type of cracking of brass is recommended. May issue: Stress-corrosion resistance of brasses containing various amounts of Zn, P, As, Sb, Si, Ni, and Al. 30 ref. (R1, Cu)

282-R. Causes and Prevention of Iron Oxide in Boilers. S. T. Powell, L. G. Von Lossberg, and J. K. Rummel. *Combustion,* v. 22, July 1950, p. 37-44.

Sources of iron oxide, and means of forestalling and minimizing corrosive conditions. 23 ref. (R4, CN)

283-R. Corrosion Resistance of Titanium Metal in a Number of Chemical Reagents. *Materials & Methods,* v. 32, July 1950, p. 75.

A table. (R5, Ti)

284-R. Corrosion of Materials of Construction Underground. I. A. Denison. *Petroleum Engineer,* v. 22, June 1950, p. D5-D8; July 1950, p. D9-D12.

See abstract of "Soil Corrosion Studies, 1946: Ferrous Metals and Alloys", *Journal of Research of the National Bureau of Standards,* item 100-R, 1950. (R8, AY)

285-R. Symposium on Thin Films. F. A. Hamm. *Analytical Chemistry,* v. 22, July 1950, p. 958-959.

Proceedings of symposium, sponsored by Armour Research Foundation, and held in Chicago, June 8-10, 1950. Aspects discussed were formation of thin films, geometry, structure, problems, and applications. Evaporation and vapor deposition of metals and dielectrics; formation of highly polished surfaces by electropolishing; effects of grain size and oxide formation on reflectivity and electrical resistivity of metals; organic films and their use in flotation; thickness-measuring instruments; and new electron microscopes. (R2, L25, L13, P15, P17, B14, S14, M21)

286-R. The Corrosion of Steel in Estuarine Tropical Water. S. A. Main and T. H. Arnold. *Journal of the Iron and Steel Institute,* v. 165, July 1950, p. 268-278.

Corrosion of various steels in waters at Freetown, Sierra Leone, was investigated, and the results compared with exposure in ordinary tropical sea water at Takoradi on the Gold Coast. Some operative factors (e.g., molluscs, sulfate-reducing bacteria, etc.) are discussed. 10 ref. (R4, ST)

287-R. The Corrosion of Steel. *Journal of the Iron and Steel Institute,* v. 165, July 1950, p. 287-300.

The following papers are discussed: "A Simple Form of Accelerated Atmospheric Corrosion Test", R. St. J. Preston; "A Study of the Corrosion Resistance of High-Alloy Steels to an Industrial Atmosphere", H. T. Shirley and J. E. Truman; "The Atmospheric Corrosion

of Iron and Steel Wires", J. C. Hudson; "Climatic Effects on the Corrosion of Steel", J. Dearden; "The Effect of Shot-Peening Upon the Corrosion-Fatigue of a High-Carbon Steel", A. J. Gould and U. R. Evans; "Corrosion Fatigue of Steel Under Asymmetric Stress in Sea Water", A. J. Gould; "High Speed Rotor Tests of Paints for Under-Water Service", F. Wormwell, T. J. Nurse, and H. C. K. Ison; and "Electrochemical Studies of Protective Coatings on Metals: Part I. Electrode Potential Measurements on Painted Steel", F. Wormwell and D. M. Brasher. The papers were published in 1948 and 1949 issues of the *Journal*. (R general, ST)

288-R. Performance of Anti-Corrosive Compositions in Sea Water; Effect of Surface Preparation of Steel. J. C. Hudson. *Journal of the Iron and Steel Institute,* v. 165, July 1950, p. 314-334.

Results show that methods of surface preparation have a marked effect on sea-water corrosion. Recommendations for practical application, especially to ships' hulls. (R4, L general, T22, CN)

289-R. Stainless Steels; Improved Resistance to Sulphuric Acid. *Iron and Steel,* v. 23, July 1950, p. 309-311.

Development of a steel resistant to H_2SO_4 of any concentration at temperatures up to 40° C. Corrosion resistance of various stainless compositions to H_2SO_4 is shown graphically for ranges of temperature and H_2SO_4 strength. The alloy developed contains 18% Cr, 18% Ni, 2% Cu, and 2% Mo. (R6, SS)

290-R. Studies on the Corrosion of Tin. VI. (In Japanese.) H. Endo and G. Yokoyama. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, Dec. 1949, p. 23-27.

Tin-rich binary alloys, such as Sn-Ag, Sn-As, Sn-Fe, Sn-Hg, Sn-Mg, Sn-Mn, Sn-Ni, Sn-P, Sn-S, Sn-Se and Sn-Si, were prepared and their corrodibilities in HCl, H_2SO_4 and HNO_3 solutions were tested. Results are tabulated and graphed. Experiments on anodic behavior of Sn-Bi alloys in NaCl solution were also made. (R5, Sn)

291-R. The Intermittent Oxidation of Some Nickel-Chromium Base Alloys. B. Lustman. *Journal of Metals,* v. 188, Aug. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 995-996.

Addition of certain alkaline-earth and rare-earth metals to Ni-Cr-base electrical resistance alloys causes marked increase in their oxidation resistance as measured in an intermittent-oxidation test. However, the mechanism of protection is still unknown. Results indicate that the observed behavior is due to the tendency of these elements to promote internal oxidation and thus to prevent spalling of the protective oxide scale during cycles of heating and cooling. The alloys tested contained approximately 80% Ni, 20% Cr, and small amounts of other elements. (R2, Ni, SG-q)

292-R. What's Eating on the Iron Horse. *Industrial and Engineering Chemistry,* v. 42, Aug. 1950, p. 16A, 18A.

Work of the D.&R.G.W. on miscellaneous railroad corrosion problems. (R general, T23, ST)

293-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 42, Aug. 1950, p. 69A-70A.

Selection of materials of construction for contact with various concentrations of HCl under various conditions of temperature, aeration, presence of other materials, etc. (R5)

294-R. Corrosion of Enameled Tin-Plate Covers on Glass Containers. Edward F. Kohman. *Industrial and Engineering Chemistry,* v. 42, Aug. 1950, p. 1578-1581.

As manufacturers of strained baby foods shifted from the use of cans to glass containers, perforation corrosion of the covers occurred more often, regardless of the weight of the tin coat on the jar covers. This indicated a heretofore unrecognized corrosion factor involving the ability of the seal to conduct an electric current. Consequently a galvanic couple is set up with metal exposed on the inside of the jar as the anode and metal exposed outside the jar as the cathode. Corrective measures are suggested. (R1, Sn)

295-R. The Behavior of the Chromium Nickel Stainless Steels in Sulfuric Acid. George C Kiefer and William G. Renshaw. *Corrosion* (Technical Section), v. 6, Aug. 1950, p. 235-244.

Corrosion rate of four commercial types and one special type of Cr-Ni-stainless in H_2SO_4 of varying concentration from 0 to 95% at four temperatures Effect of additions of various sulfates and oxidizing agents. (R5, SS)

296-R. The Influence of Stress on Corrosion. Part I. Julius J. Harwood. *Corrosion* (Technical Section), v. 6, Aug. 1950, p. 249-259.

Effects of stress on internal structure and energy characteristics of

metals in relation to their influence on corrosion reactions. The nature and importance of residual stresses and the non-homogeneity of worked metals. Recent concepts of the nature of grain boundaries Methods of protection against stress-corrosion cracking. 40 ref. (To be concluded.) (R1)

297-R. Some Aspects of the Corrosion of Tin Plate by Prunes. V. W. Vaurio. *Corrosion* (Technical Section), v. 6, Aug. 1950, p. 260-267.

Evidence indicates that, in prunes at least, tin corrodes at a constant rate without the evolution of measurable quantities of hydrogen. Hydrogen evolution in canned prunes is related directly to the solution of the iron of the steel base. Shows that tin affords cathodic protection to steel in contact with prunes. These tests indicate that porosity is not an important factor. 11 ref. (R5, Sn)

298-R. Application of Corrosion-Resisting Materials to Railroad Electrical Construction. H. F. Brown. *Corrosion* (Technical Section), v. 6, Aug. 1950, p. 268-273. (A condensation.)

Summarizes work of AAR committee on relative corrosion of ferrous and nonferrous alloys in various atmospheres (smoky and clean, sea coast, and inland) in order to determine the most economical alloys for use in overhead contact systems of electrified railways. Includes work on protective coatings. (R3, L general, T1)

299-R. Condensation of First Interim Report on Galvanic Anode Tests of Sub Committee TP-2—Galvanic Anodes for Cathodic Protection. *Corrosion* (Technical Section), v. 6, Aug. 1950, p. 274-275. (R10)

300-R. Cathodic Corrosion — Cause and Prevention. *SAE Journal,* v. 58, Aug. 1950, p. 96, 98. Based on "Cathodic Control of Corrosion" by Hiram Walker.

Mechanism of cathodic protection and how it is used for preservation of underground structures, ship hulls, steel piling, docks, heat exchangers, condensers, and pipe lines carrying sea water. (R10, Fe)

301-R. The Mechanism of Lubricating Oil Breakdown and Its Relation to Oil Corrosion. W. F. Weiland. *Scientific Monthly,* v. 71, Aug. 1950, p. 121-122.

Four methods which have been used in the author's laboratory to correlate acid-vapor temperatures with incipient corrosion. (Acid-vapor temperatures are those at which volatile acids first form.) (R7, A5)

302-R. Corrosion Control in the Lake Maracaibo Oil Fields. John H. Zauner. *World Oil,* v. 131, Aug. 1950, p. 229-230, 232, 234.

Work of Creole Petroleum Corp. Marine organisms, particularly the destructive teredo, are impartial in their tastes—attacking steel, aluminum, wood, rubber, and synthetic compounds with equal vigor. (R1)

303-R. Corrosion and Related Problems in Sea-Water Cooling and Pipe Systems in H. M. Ships. I. G. Slater, L. Kenworthy, and R. May. *Journal of the Institute of Metals,* v. 77, June 1950, p. 309-330.

Deterioration of miscellaneous component parts. Impingement attack and deposit attack were the two most prominent types of corrosion encountered. The main factors are water speeds with related eddies and turbulence, entangled air bubbles, tube obstructions, and contamination of the water. Preventive measures include selection of materials, use of protective coatings, use of different alloys in the same system, modification of design, and maintenance routine. Materials are tough-pitch Cu, deoxidized Cu, arsenical Cu, Naval brass, Cupronickel, Al brass, cast gunmetal and phosphor bronze. (R4, Cu)

304-R. The Jet-Impingement Apparatus for the Assessment of Corrosion by Moving Sea-Water. R. May and R. W. De Vere Stacpoole. *Journal of the Institute of Metals,* v. 77, June 1950, p. 331-344.

Failure of condenser-tube and seawater pipes occurs largely as a result of the corrosive-erosive action of air bubbles carried in the water stream. An apparatus which reproduces condition favorable for this type of attack. Construction of apparatus, test procedure, and evaluation of results. (R4)

305-R. Pitting Corrosion in Copper Water Pipes Caused by Films of Carbonaceous Material Produced During Manufacture. Hector S. Campbell. *Journal of the Institute of Metals,* v. 77, June 1950, p. 345-356.

A number of cases were investigated. All the samples examined were found to contain films of carbonaceous material. A close connection was found between the weight of carbon present as film and the presence or absence of pitting in 16 copper water pipes, where failure had not occurred. It was

concluded that the pitting corrosion was caused by films formed from drawing lubricant residues during annealing. (R2, R7, Cu)

306-R. Concerning Corrosion Resistance of Chromium-Nickel Stainless Steels to Commercial Sulfuric Acid. (In French.) J. M. Defranoux. *Revue de Métallurgie,* v. 47, June 1950, p. 447-453; discussion, p. 454.

Results of experiments indicate the existence of a "passive" state; however, the rate of corrosion in this state is still appreciable. Resistance to corrosion of 18-8 stainless containing 2.5% Mo depends to a considerable extent on the presence of impurities in the H_2SO_4. Intentional addition of certain substances in small amounts, especially NO_3 ion, N_2O_3, Fe^{+++}, and As^{+++} makes it possible to use this stainless steel in contact with commercial H_2SO_4. (R5, SS)

307-R. Capillaries, Capillary Systems, and Capillarity. XXII/5. The Importance of the Donnan Blockage to Corrosion Protection by Polar Coatings and to Substantive Dyeing. (In German.) E. Manegold. *Kolloid Zeitschrift,* v. 116, Mar. 1950, p. 135-146.

Shows that in a capillary system of ionic-polar material, the migration of ions can be obstructed by an electrical blockage. This fact materially reduces the corrosion of metals through protective coatings and hinders the dyeing of textile fibers. 14 ref. (R10, L general)

308-R. Test Results on Underwater Coatings on Stationary Structural Steel Parts. (In German.) W. Husse. *Chemische Technik,* v. 2, Apr. 1950, p. 126-128.

Results of long-time experiments. (R4, L general, ST)

309-R. The Oxidation of Vapor-Deposited Al-Mg and Al-Ag Alloys in Vacuum. II. (In German.) A. Boettcher. *Zeitschrift für angewandte Physik,* v. 2, June 15, 1950, p. 249-251.

Studied from 350 to 900° C. and at a very low pressure in order to reveal the structure of very thin oxide films. Electron-diffraction techniques were used. Typical patterns. Application of the method to the fundamental study of corrosion and of secondary-electron emission. (R2, Mg, Al, Ag)

310-R. The Rate of Copper Corrosion in Salt Solutions. (In German.) Walter Katz. *Metalloberfläche,* v. 4, sec. A, July 1950, p. 101-104.

Results of a kinetic and thermodynamic study. (R5, Cu)

311-R. Solubility of Aluminum During Cathodic Polarization. (In Russian.) B. Kabanov and A. Zak. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 72, May 21, 1950, p. 531-534.

Solubility of 99.9955% Al in various alkaline solutions and using current densities of 1-10 amp. per sq. cm. was investigated. Shows curves for KOH, NaOH and LiOH. Results are subjected to theoretical analysis. (R11, Al)

312-R. Relationship Between Constitution Diagram of an Alloy and Its Tendency to Corrosion. (In Russian.) Yu. A. Klyachko and S. A. Shapiro. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 72, June 1, 1950, p. 707-709.

This relationship was studied for the Mg-Sn and Al-Mg systems. Data indicate that a definite relationship exists. Practical application. (R general, M24, Mg, Sn, Al)

313-R. Stop Accelerated Oxidation and Get Better Jet Engines. Anton De S. Brasunas and N. J. Grant. *Iron Age,* v. 166, Aug. 17, 1950, p. 85-90.

Formation of oxides of V, Bi, Mo, W, and Pb on high-temperature steel is shown to promote "accelerated oxidation", because of contamination of the original oxide phase. The corrosion product formed does not act as a barrier to continued attack. Test samples are illustrated following high-temperature air oxidation. Optimum compositions for minimizing attack; effects of external contaminations. 15 ref. (R2, SS, SG-g, h)

314-R. Aluminum Decreases Corrosion Resistance of Austenitic Stainless. R. W. Stewart and S. F. Urban. *Iron Age,* v. 166, Aug. 17, 1950, p. 91-95.

Presence of sigma phase, rather than chromium carbide precipitation, is responsible for the low corrosion resistance of Ti-stabilized austenitic stainless steels in boiling 65% HNO_3, when tested after sensitizing treatment. The quantity of sigma can be minimized by rather close control of Al, Cr, and Ni contents. (R5, N8, SS)

315-R. Stress Corrosion. *Metal Progress,* v. 58, Aug. 1950, p. 240, 242, 244. Translated and condensed from "The Effect of Atmospheric Exposure on the Stress Corrosion of Aluminum Alloys", Gerhard Schikorr and Gunter Wassermann.

Previously abstracted from *Zeitschrift für Metallkunde.* See item 6D-27, 1949. (R1, Al)

316-R. Stress-Corrosion Resistance of Wrought Magnesium Alloys. *Technical News Bulletin* (National Bureau of Standards), v. 34, Aug. 1950, p. 108-110.

See abstract of paper by Hugh L. Logan and Harold Hessing, *Journal of Research of the National Bureau of Standards,* item 175-R, 1950. (R1, Mg)

317-R. Do Atmospheric Conditions Affect Magnesium? *Magazine of Magnesium,* Aug. 1950, p. 2-5.

A number of practical applications of bare Mg which show that it is not subject to atmospheric corrosion to any extent. (R3, Mg)

318-R. Magnesium Anodes and Common Sense. Marshall E. Parker. *Petroleum Engineer,* v. 22, Aug. 1950, p. D24-D26.

How use of Mg as source of electrical energy can lessen and sometimes eliminate corrosion. (R10, Mg)

319-R. The Fundamentals of Galvanic Corrosion. A. B. Lauderbaugh. *Oil and Gas Journal,* v. 49, Aug. 17, 1950, p. 97-98, 101-102, 107.

An elementary explanation, including schematic diagrams. (R1)

320-R. The Action of Boiling Distilled Water on Aluminium. J. M. Bryan. *Journal of the Society of Chemical Industry,* v. 69, June 1950, p. 169-173.

Al and Al alloys react initially with boiling water with the evolution of hydrogen, but the action is quickly arrested by formation of a highly resistant film of alumina monohydrate. Impurities and alloying elements in the metal and emery treatment of the surface have some influence on the reaction, but the most important factor in preventing corrosion from continuing indefinitely appears to be the presence of a certain minimum quantity of Si in the metal. (R4, Al)

321-R. Corrosion Testing. T. P. Hoar. *Journal of the Birmingham Metallurgical Society,* v. 30, June 1950, p. 63-72.

Objects of corrosion testing; properties measured in corrosion testing; and special techniques in common use. (R11)

322-R. The Oxidation of Several Metals in Activated Oxygen at High Temperatures. Andrew Dravnieks. *Journal of the American Chemical Society,* v. 72, Aug. 1950, p. 3761-3767.

Oxidation of Cu and several other metals in ordinary and in activated O_2 are compared. Only in the case of Cu are reproducible differences caused by the presence of an excess of free oxygen atoms. Monatomic oxygen may accelerate, retard or not influence the rate of oxidation. Conditions for appearance of Cu_2O in the scale and an explanation of some types of complex oxidation curves. 18 ref. (R2, Cu)

323-R. Materials Selection Chart. N. S. Mott. *Chemical Engineering,* v. 57, Aug. 1950, p. 197-200.

Chart lists common industrial chemicals and materials in alphabetical order. Degree of resistance to corrosion by each material of carbon steel; stainless types 304, 316, and FA-20; and a few Ni alloys is indicated qualitatively. (R5, R6, R7, T29, CN, SS, Ni)

324-R. Corrosion of Metals Underground. *Gas Age,* v. 106, Aug. 17, 1950, p. 30-31.

Outlines work of Denison and Romanoff of the National Bureau of Standards. Approximately 3000 specimens of representative pipe materials, exposed to soil corrosion for periods up to 14 years, have been examined, and loss of weight and depth of pitting measured and interpreted. The specimens were buried at 15 test sites widely separated throughout the U. S. (R8)

325-R. Durability of Aluminum and Its Alloys — Atmospheric Exposure. *Light Metals,* v. 13, July 1950, p. 395-402; Aug. 1950, p. 429-438.

Results of tests on weathering and soil attack on various alloys. Protective coatings; behavior in roofing structures. 12 ref. (R3, R8, T26, Al)

326-R. Erosion and Corrosion Accompanying the Use of Heavy Fuel Oils as Engine, Boiler, and Gas Turbine Fuels. (In German.) B. Engel. *Erdöl und Kohle,* v. 3, July 1950, p. 321-327.

Causes and specific suggestions for reducing or preventing such attack. 10 ref. (R7)

327-R. The Fundamentals of Galvanic Corrosion. A. B. Lauderbaugh. *Gas Age,* v. 106, Aug. 31, 1950, p. 20-25, 58, 60.

Previously abstracted from *Oil and Gas Journal.* See item 319-R, 1950. (R1)

328-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 42, Sept. 1950, p. 111A-112A.

Metals and alloys generally used and suitable for handling HCl. (R5)

329-R. Tower Corrosion Arrested With Boiler Blow-Down Water. *Oil and Gas Journal,* v. 49, Aug. 31, 1950, p. 84.

Severe corrosion in shell of vapor stripper of distillation column (pH of 4.5 for the steam condensate present) caused failure in shell and opposite downcomer weirs on top three plates. Boiler blowdown water (pH of 11) was fed in, to bring condensate mixture to neutral point, or slightly alkaline. A small pressure-type filter was constructed to remove sludge and solids. Further corrosion was arrested. (R7, CN)

330-R. Volatile Corrosion Inhibitors; New Rust Preventatives May Revolutionize Ordnance Packaging. Gilbert Foster. *Ordnance,* v. 35, sec. 1, Sept.-Oct. 1950, p. 158-160.

Use of dicyclohexylamine nitrite and related compounds for the above. The materials are placed with the ordnance items, which are then placed in airtight bags. Suitable only for ferrous metals at present. (R10, T2, Fe)

331-R. Effect of Barnacles and Corrosion on Metals and Alloys Suspended in Sea Water. Starr Thayer. *Corrosion* (News Section), v. 6, Sept. 1950, p. 1.

Observations made of several metals and alloys submerged in sea water of Galveston Bay, Texas, for 110 days. (R1, R4)

332-R. Corrosion of Metals in Fluorine and Hydrofluoric Acid. G. C. Whitaker. *Corrosion* (Technical Section), v. 6, Sept. 1950, p. 283-285.

Experience based on the literature and several years' experience. 10 ref. (R5)

333-R. Corrosion Problems in the Railroad Industry. Ray McBrian and L. C. Atchison. *Corrosion* (Technical Section), v. 6, Sept. 1950, p. 286-289; discussion, p. 289.

Some of the specific problems found with various types of motive power, track materials, and passenger and freight cars. Such complex problems as abrasion corrosion, vibration corrosion, wear of diesel locomotive surfaces, and problems specifically related to climatic conditions or refrigerator-car ice-brine drainage. (R general, T23)

334-R. The Influence of Stress on Corrosion. Part II. (Concluded.) Julius J. Harwood. *Corrosion* (Technical Section), v. 6, Sept. 1950, p. 290-307.

Nature of stress-corrosion, test methods, theories, preventive methods, and stress-corrosion in commercial-metal systems. 41 ref. (R1)

335-R. Electrochemical Behavior of Zinc and Steel in Aqueous Media. Part II. R. B. Hoxeng. *Corrosion* (Technical Section), v. 6, Sept. 1950, p. 308-312; discussion, p. 312.

Shows that constituents present in natural waters have a pronounced effect on the electro-chemical behavior of zinc. In laboratory tests it was found that the effect of Cd, even in small amounts, was to shift the potential of Zn in the anodic direction. Silicate additions likewise promote anodic Zn potentials, tending thereby to decrease the possibility of reversals in Zn-steel couples. Additional laboratory data confirm earlier evidence that temperature is secondary to electrolyte composition in its effect. (R1, R4, Zn, ST)

336-R. An Electrochemical Mechanism of Corrosion Inhibition by Chromates, Nitrites and Other Oxidants. Marcel Pourbaix and Pierre Van Rysselberghe. *Corrosion* (Technical Section), v. 6, Sept. 1950, p. 313-315.

A portion of a theoretical and experimental study of inhibitors based upon use of the polarographic method. Classifies corrosion inhibitors as surface conversion inhibitors; adsorption inhibitors; and diffusion inhibitors; with examples of each. A brief analysis of the mechanism of each type. (R10, Fe)

337-R. "AC"—A New Corrosion Test. Thomas E. Lloyd. *Journal of Metals,* v. 188, Sept. 1950, p. 1092-1093.

The alternate condensation method appears to offer a technique more comparable to normal weather corrosion than any yet devised. Unlike other methods, it uses a condensate rather than a dip or a spray to effect corrosive action. Equipment and procedure. (R11)

338-R. Studies on Galvanic Couples. II. Some Potential-Current Relations in Galvanic Corrosion. H. D. Holler. *Journal of the Electrochemical Society,* v. 97, Sept. 1950, p. 277-282.

Develops graphic method for expressing the electrical characteristics of a galvanic couple. A definite current pattern was demonstrated with the iron-magnetite couple. If these relations can be determined in the case of pipe-lines and other underground structures, it may be possible to evaluate the total galvanic current flowing in the phase boundary and, therefore, the rate of corrosion. Then, it may be possible to estimate how much externally applied potential or current is required to stop corrosion. (R1)

339-R. Corrosion Rate and Etch Structures of Aluminum; Effect of Heat Treatment and Impurities. B. Roald and M. A. Streicher. *Journal of the Electrochemical Society,* v. 97, Sept. 1950, p. 283-289.

Effect of heat treatment of Al

ranging in purity from 99.2 to 99.998% on rates of dissolution and resulting etch structures in HCl and NaOH. 21 ref. (R2, J general, Al)

340-R. The Rate of Corrosion of Silver in Solutions of Ferric Sulfate. Hugh Salzberg and Cecil V. King. *Journal of the Electrochemical Society,* v. 97, Sept. 1950, p. 290-297.

Corrosion rate as a function of concentration of ions involved, concentration of acid, speed of stirring, temperature, and emf. of the Ag-Ag ion, ferric-ferrous ion cell. A rate equation is derived which includes the effects of adsorption and of the reverse reaction. 15 ref. (R5, Ag)

341-R. Corrosion Resistance and Mechanical Properties of Carbon Austenitic Stainless Steels. D. C. Buck, J. J. Heger, F. J. Phillips, and B. R. Queneau. *American Society for Testing Materials,* "Symposium on Evaluation Tests for Stainless Steels", Special Technical Publication No. 93, 1950, p. 56-80; discussion, p. 81-86, 217-231.

Tests for 18-8, 18-8Cb, 18-8Mo, and 18-8MoCb, and corrosion tests of welded samples. Includes micrographs. (R11, Q general, SS)

342-R. Accelerated Corrosion Testing of Chromium-Nickel Stainless Steel Weldments. F. K. Bloom and M. E. Carruthers. *American Society for Testing Materials,* "Symposium on Evaluation Tests for Stainless Steels", Special Technical Publication No. 93, 1950, p. 87-100; discussion, p. 100-102, 217-231.

Three common tests and a comparison of their results with field experience using a welded pickling tank. The nitric-hydrofluoric acid test appeared to be the most severe criterion of susceptibility to weld decay. 15 ref. (R11, K9, SS)

343-R. An Appraisal of Methods for Evaluating the Corrosion Resistance of Stainless Steels. M. H. Brown, W. B. DeLong, and W. R. Myers. *American Society for Testing Materials,* "Symposium on Evaluation Tests for Stainless Steels", Special Technical Publication No. 93, 1950, p. 103-119; discussion, p. 119-120, 217-231.

Compares three test methods and considers the effect of alloy composition on routine HNO_3 tests on stainless castings. Value of tests compared to service failure. (R11, SS)

344-R. Some Observations on Tests for Intergranular Susceptibility of 18-8 Mo Stainless Steels. H. Ebling and M. A. Scheil. *American Society for Testing Materials,* "Symposium on Evaluation Tests for Stainless Steels", Special Technical Publication No. 93, 1950, p. 121-138; discussion, p. 138-145, 217-231.

A large number of variables exist in present testing practice and a standard practice should be inaugurated. Using a acidified $CuSO_4$ solution, tests were made on Type 316 heats to determine effects of stabilizing heat treatment temperature (1550 and 1650° F.), time, and cooling rate. Other tests were made to study effects of sensitizing at 800 and 900° F. for 500 hr. after stabilizing heat treatment. Comparison tests were made on Type 316-Cb. (R11, R2, SS)

345-R. Influence of Carbon and Molybdenum on the Intergranular Corrosion Resistance of Austenitic Chromium-Nickel Steels With and Without Columbium. W. O. Binder and C. M. Brown. *American Society for Testing Materials,* "Symposium on Evaluation Tests for Stainless Steels", Special Technical Publication No. 93, 1950, p. 146-171; discussion, p. 172-182, 217-231.

Compares intergranular corrosion tests made on five types of 18-8 steel containing 0.06 and 0.03% maximum carbon, including Mo and Mo-Cb variations. The HNO_3 test reveals intergranular attack due to phase formation and to chromium carbide precipitation; however, another test must be used to distinguish between the two causes. (R2, R11, SS)

346-R. Comparative Corrosion Resistance of Stainless Steels in Various Acids. R. B. Mears, C. P. Larrabee, and C. F. Fetner. *American Society for Testing Materials,* "Symposium on Evaluation Tests for Stainless Steels", Special Technical Publication No. 93, 1950, p. 183-187; discussion, p. 188-191, 217-231.

Results are compared for Types 304 and 316 in both annealed and sensitized conditions exposed to boiling sulfuric, nitric, lactic, phosphoric and acetic acids. (R11, R5, SS)

347-R. Comparison of Plant Corrosion Test Results on Austenitic Stainless Steels With Results of Huey and Strauss Tests. H. O. Teeple. *American Society for Testing Materials,* "Symposium on Evaluation Tests for Stainless Steels", Special Technical Publication No. 93, 1950, p. 192-199; discussion, p. 188-191.

Data were obtained by exposing test specimens using unwelded, as-welded, and welded and heat treated specimens of Types 304, 347, and 316. Results and composition data. (R11, SS)

348-R. Results of Some Plant Corrosion Tests of Welded Stainless

Steels. George F. Comstock. *American Society for Testing Materials,* "Symposium on Evaluation Tests for Stainless Steels", Special Technical Publication No. 93, 1950, p. 200-209; discussion, p. 209-210; 217-231.

Corrosion tests were made in chemical plants under regular operating conditions, and results compared with those obtained by the standard boiling HNO_3 procedure. Specimens included Types 304, 321, and 347 sheets, welded with Types 308, 321, and 347 electrodes, respectively, and tested both in as-welded and stress-relieved conditions. Results show no correlation. (R11, SS)

349-R. Testing Multiple Specimens of Stainless Steels in a Modified Boiling Nitric Acid Test Apparatus. William B. DeLong. *American Society for Testing Materials,* "Symposium on Evaluation Tests for Stainless Steels", Special Technical Publication No. 93, 1950, p. 211-214; discussion, p. 215-216, 217-231.

Apparatus, procedure and results. (R11, SS)

350-R. Cavitation in Liquids. E. G. Richardson. *Endeavour,* v. 9, July 1950, p. 149-153.

Summarizes knowledge of cavitation, which plays a part in the design of ships' propellers, in the study of certain types of metallic corrosion, and in the application of some ultrasonic techniques. (R2)

351-R. Durability of Aluminium and Its Alloys — Atmospheric Exposure. *Light Metals,* v. 13, July 1950, p. 395-402; Aug. 1950, p. 429-438.

Results of tests on weathering and soil attack on various alloys. Protective coatings. Behavior in roofing structures. 12 ref. (R3, T26, Al)

352-R. The Nature and Scope of Temporary Corrosion Preventives. D. Clayton and M. C. Thompson. *Journal of the Institute of Petroleum,* v. 36, July 1950, p. 423-428.

Usual types and newer developments. Field of use and principal causes of failure. Some questions concerning accelerated testing are raised. (R10, R11)

353-R. Assessment of the Protective Value of Temporary Corrosion Preventives (With Particular Reference to Humidity Cabinet Tests). T. G. Clinton. *Journal of the Institute of Petroleum,* v. 36, July 1950, p. 428-435.

Use of a humidity cabinet and an intermittent salt-spray test. Accelerated weathering, continuous salt-spray, and natural weathering tests are mentioned. (R11)

354-R. Use of Weatherometer and Humidity Cabinets for Evaluation of Temporary Corrosion Preventives. W. Pohl. *Journal of the Institute of Petroleum,* v. 36, July 1950, p. 436-448. (R11)

355-R. A Method for the Evaluation of Soft-Film Temporary Corrosion Preventives for Ferrous Articles. T. P. Hoar and G. C. Smith. *Journal of the Institute of Petroleum,* v. 36, July 1950, p. 448-457.

A very thin but reproducible film is deposited from a volatile solvent onto a clean steel surface, and the incidence of corrosion due to small drops of distilled water is determined after 24 hr. The technique was used to evaluate the relative protective value of several mineral-jelly compositions with amphipathic substances. Results are discussed in terms of adsorption of a firmly held monolayer of amphipathic substance on the oxide-film. (R11, ST)

356-R. Application of an Accelerated Atmospheric Corrosion Test to the Assessment of Temporary Corrosive Preventives. R. St. J. Preston and E. G. Stroud. *Journal of the Institute of Petroleum,* v. 36, July 1950, p. 457-463.

Test in which specimens are exposed in a thermostatically controlled humid atmosphere containing SO_2, and its use in the evaluation of materials ranging from light lubricating oil, through petroleum jelly, to bitumen for protection of steel panels. (R11, ST)

357-R. Tests of the Protective Value of Temporary Corrosion Preventives on Steel. S. G. Clarke and E. E. Longhurst. *Journal of the Institute of Petroleum,* v. 36, July 1950, p. 463-473.

Results of tests made by relatively simple methods. (R11, ST)

358-R. Investigations Into Tropic Proofing of Electrical Material, 1943-46. V. The Corrosion of Copper Wires at D. C. Potential in Contact With Electrical Insulating Materials. R. J. Meakins. *Australian Journal of Applied Science,* v. 1, Mar. 1950, p. 128-132.

Method of investigation under moist conditions. Results indicate that corrosion of this type depends chiefly on the affinity for water of the insulating materials with which the copper wires are in contact. Severe corrosion was observed in tests with cellulose materials, which are highly polar, whereas non-polar materials did not give corrosion. 11 ref. (R3, T1, Cu)

359-R. Hydrophobic Treatment of Metallic Powders for Their Protection Against Corrosion. (In Russian.) A. I. Levin and A. V. Pomosov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR),

new ser., v. 72, June 21, 1950, p. 1075-1078.

Proposes decreasing the tendency of Cu powder to moisture absorption by formation on the surface of the Cu particles of a hydrophobic adsorption layer using surface-active organic compounds of the fatty and aromatic series. Experimental investigation showed the possibility of using such compounds with excellent results. (R10, Cu)

360-R. Anthracene-Oil Bases as Inhibitors for Use in Chemical Removal of Boiler Scale. (In Russian.) N. A. Gruzdeva. *Promyshlennaya Energetika* (Industrial Power), v. 7, June 1950, p. 14-16.

Physical characteristics of and comparative data on anthracene bases vs. other common inhibitors. (R10)

361-R. Corrosion of Some Light Alloys. (In Italian.) P. Brenner. *Alluminio*, v. 19, no. 3, 1950, p. 225-236. Translated from the German.

Previously abstracted from *Metalloberfläche.* See item 98-R, 1950. (R1, R2, Al)

362-R. Stress-Corrosion Cracking of Mild Steel. R. N. Parkins. *Welding Journal*, v. 29, Sept. 1950, p. 458s.

Discusses paper by D. Cubicciotti and William Boyer (Mar. issue; item 112-R). Believes that conclusion of the latter that cold working of the metal acts as a preventative to stress-corrosion is not justified. Includes authors' reply. (R1, CN)

363-R. The Corrosion of Iron. Manfred Ragg. *Paint, Oil and Chemical Review*, v. 113, Sept. 14, 1950, p. 12, 14, 16, 18.

The immense annual loss by corrosion. The corrosion mechanism, including passivation and chemical surface treatments. (R general, Fe)

364-R. (Book) **Thin Films and Surfaces.** Winifred Lewis. 120 pages. 1950. Chemical Publishing Co., 26 Court St., Brooklyn 2, N. Y. $4.75.

Critical survey of the results of research on thin metallic films and surfaces with special reference to aluminum. What is known about the structure, production, and mechanical, optical, magnetic, electrical, and chemical properties of thin metallic films and surfaces in general. (R2, L general, Al)

365-R. (Book) **Symposium on Evaluation Tests for Stainless Steels.** 231 pages. 1948. American Society for Testing Materials (Special Technical Publication No. 93), 1916 Race St., Philadelphia 3, Pa.

Ten papers discussing significance of laboratory evaluation tests in relation to practical experience under diverse service conditions. Effects on behavior of test alloys and effects of lowering carbon contents to extremely low limits. Papers are abstracted separately. (R11, SS)

366-R. Tarnishing of Nickel-Silver. A. L. Simmons. *Metal Progress*, v. 58, Sept. 1950, p. 345-347.

Tarnishing which developed during storage was traced to slight contamination with acetic acid from green hardwood packing cases, which penetrated sealed plastic wrappings and pitted and discolored the metal badly during a spell of humid weather. Precautions adopted. (R2, Cu)

367-R. Rapid Tests for Intercrystalline Corrosion. Eugene Herzog. *Metal Progress*, v. 58, Sept. 1950, p. 355-356.

Discusses paper by Hugh L. Logan (Feb. issue; see item 61-R). Reports similar findings of French laboratory. A similar method was used on Al-Mg and Al-Mg-Si alloys. Includes Logan's comments. (R2, Al)

368-R. "Green Rot" of Electrical Resistors. Tom Bishop. *Metal Progress*, v. 58, Sept. 1950, p. 356.

Attack on Ni-Cr resistance alloys exposed to carbonaceous gases. Causes and possible prevention by use of 2% Si or Ti in the alloy. (R9, Ni, SG-q)

369-R. Metals for High-Pressure Hydrogenation Plants. G. A. Nelson. *Petroleum Refiner*, v. 29, Sept. 1950, p. 104-110.

Previously abstracted from "'Hydrogenation Plant Steels", *Proceedings, American Petroleum Institute* (Refining Div.), v. 29 M. See item 35-R, 1950. (R9, T29, CN, AY)

370-R. Corrosion in a Neutral Semi-Chemical Pulp Mill. L. W. Murtfeldt. *Paper Trade Journal*, v. 131, Sept. 21, 1950, p. 23-24, 26.

Ferrous metals and alloys required for resistance to corrosion at various locations in the mill. (R7, T29)

371-R. Damage to Superheaters and Air Preheaters With Oil Firing. H. Liander. *Combustion*, v. 22, Sept. 1950, p. 47-50. Translated from *Teknisk Tidskrift.*

Severe damage occurred in two distinct forms in boilers of a Swedish power station due to flue-gas contact. The first was straight corrosion of stainless steels; the second was caused by burning of an oil deposit which caused actual melting of the steel. (R9, SS)

372-R. How Boiler Steel Can Disappear. Harry M. Spring. *Power,* v. 94, Oct. 1950, p. 116-117.

Various forms of corrosion attack, their causes and prevention. (R4, ST)

373-R. Cost, and Savings Effected by Cathodic Protection for a Short Section of Line. James F. Stephenson. *Oil and Gas Journal,* v. 49, Sept. 21, 1950, p. 240-241.

Application to ten pipe lines in the same right-of-way near Gulf's Port Arthur refinery. Savings in money, materials, and shutdown time. (R10, CN)

374-R. How Gulf Pipe Line Locates 'Hot Spots' on Crude-Oil Lines. M. C. Callahan. *Oil and Gas Journal,* v. 49, Sept. 21, 1950, p. 312, 314-315.

Methods used by Gulf Refining Co. to locate corroded sections without uncovering the pipe. (R7, CN)

375-R. The Oxidation of Zirconium at High Temperatures. Daniel Cubicciotti. *Journal of the American Chemical Society,* v. 72, Sept. 1950, p. 4138-4141.

Rate of consumption of oxygen by ductile Zr was studied in the range 600-920° C. Rates were not affected by changing O_2 pressure from 0.1 to 20 cm. (R2, Zr)

376-R. The Copper-Strip Test—A Study of Current Methods of Interpretation and an Examination of Proposed New Procedures. F. W. H. Mat-thews and D. F. Parsons. *Proceedings, American Petroleum Institute* (Refining Div.), v. 30M(III), 1950, p. 24-36; discussion, p. 36-37.

IP and ASTM methods for evaluating the corrosive properties of oils by means of the copper-strip test, and difficulties met in classifying tarnished strips by the color produced. A new method, designated the "cathodic-reduction" method. Cupric and cuprous sulfides and oxides may be distinguished and estimated. Action of peroxidic "inhibitors" of corrosion, relation between "corrosive" sulfur in the material and sulfur on the strip, and effect of "free" or "elemental" sulfur in the presence of other sulfur compounds. (R7)

377-R. Corrosion of Relief Valves in Sour-Crude Service. R. J. Hafsten. *Proceedings, American Petroleum Institute* (Refining Div.), v. 30M(III), 1950, p. 81-86; discussion, p. 87.

The relationship between atomic hydrogen and failure of relief-valve springs by embrittlement. Metallizing with aluminum eliminated the failures. Corrosion of 17-20% Cr steel disk guides was prevented by electroplating with 0.002-0.003 in. of hard Cr. Intergranular corrosion of relief-valve nozzles and disks. (R7, SS, SG-g)

378-R. Design of Cathodic Protection for Open-Box Type Coolers. C. R. Draughon, Jr., and E. B. McNeil. *Proceedings, American Petroleum Institute* (Refining Div.), v. 30M(III), 1950, p. 88-99; discussion, p. 100-102.

Previously abstracted from *Petroleum Refiner.* See item 205-R, 1950. (R10, CN)

379-R. The Behavior of Iron-Modified 70-30 Cupro-Nickel Alloy in Salt Water and in Some Petroleum-Industry Environments. F. L. LaQue and J. F. Mason, Jr. *Proceedings, American Petroleum Institute* (Refining Div.), v. 30M(III), 1950, p. 103-119; discussion, p. 119.

Data secured over the past several years in tests at Kure Beach and elsewhere. Apparatus used. (R4, R7, Cu)

380-R. Experimental Studies of Iron Oxide Deposits in Boilers. Clarence Jacklin and Harris Thompson. *Proceedings of the Midwest Power Conference,* v. 12, 1950, p. 108-113.

Experiments made to determine causes of rapid attack and failures. (R4, ST)

381-R. Steel, Heat and Water Localized Formation of Magnetic Iron Oxide in Power Boilers. H. M. Rivers and W. M. Sonnett. *Proceedings of the Midwest Power Conference,* v. 12, 1950, p. 114-121.

Previously abstracted from *Blast Furnace and Steel Plant.* See item 231-R, 1950. (R4, CN)

382-R. Magnetic Iron Oxide Scale in a 420 PSI Boiler. John H. Moore. *Proceedings of the Midwest Power Conference,* v. 12, 1950, p. 122-132.

Source and character of the raw water at Hoot Lake (Minn.) station. Appearance of magnetic iron oxide, condition of boiler at several inspection intervals, and remedies applied. (R4, ST)

383-R. Causes and Prevention of Iron Oxide in Boilers. S. T. Powell, L. G. Von Lossberg, and J. K. Rummel. *Proceedings of the Midwest Power Conference,* v. 12, 1950, p. 133-146.

Nature and concentration of iron oxides in the boiler plant, investigation in steam plants, external corrosion (boiler accessories), internal corrosion, and corrective measures. 23 ref. (R4, ST)

384-R. Studies of Weathering of Paints. W. N. B. Armstrong and O. J. Schierholtz. *Canadian Chemistry and Process Industries,* v. 34, Sept. 1950, p. 735-741, 755.

Results of comparative tests us-

ing the "Weather-Ometer" (an accelerated-weathering test apparatus) and 45° south exposure. Seven types of paint were applied to steel panels. Results are tabulated and illustrated by low-power photomicrographs. Differences in nature of film breakdown between the two methods were quite marked; however, the accelerated procedure is useful if the results are carefully interpreted. (R11, L26, CN)

385-R. The Pathology of Metals; Corrosion of Steel and Alclad Parts by a Fungus. W. J. Copenhagen. *Metal Industry,* v. 77, Sept. 8, 1950, p. 137.

Corrosion which occurred during overseas shipment in wooden packing cases. It is believed that the corrosion was due to use of unseasoned wood containing mold spores, and to inadequate ventilation. (R1, ST, Al)

386-R. Corrosion Damage From Wood-Impregnating Agents and Attack of the Corrosion Products on Impregnated Wood. (In German.) F. Moll. *Werkstoffe und Korrosion,* v. 1, May 1950, p. 169-170.

(R7, Fe)

387-R. Relationship of the Reaction Mechanism of Atmospheric Oxygen to the Theory of Local Galvanic Corrosion. (In German.) G. Brinkmann. *Werkstoffe und Korrosion,* v. 1, June-July 1950, p. 217-232.

Experiments made to study the transfer of oxygen to metals (Zn, Fe, and Al) by way of activated carbon, oxidation of the metals thus being, in principle, an electrochemical process. Experimental method described can be used to study metals, electrolytes, and depolarizing agents in galvanic cells, and the reactive behavior of activated carbon. 28 ref. (R1)

388-R. The Anodic Corrosion of Large-Surface Lead Plates With Small Alloying Additions in Lead-Sulfuric Acid Storage Batteries. (In German.) W. Hofmann and H. G. Petri. *Werkstoffe und Korrosion,* v. 1, June-July 1950, p. 232-238.

Effects of 0.002-0.05% Ag, As, Co, Cu, Hg, Ni, Sb, Sn, and Zn. The batteries were charged and discharged up to 1000 times each. Anodic corrosion was studied on the basis of changes in capacitance of the lead, dimensions and weight of the plates, of sludge formation, and by microscopic observation. (R1, Pb)

389-R. Electrochemical and Chemical Oxygen Corrosion. (In German.) F. Tödt. *Werkstoffe und Korrosion,* v. 1, June-July 1950, p. 244-247.

The curve of corrosion vs. time of iron exposed to the atmosphere and the decrease with time of cathodic oxygen depolarization for a typical cell (cathode—iron on platinum exposed to air; unpolarizable anode—Cd or Fe in a concentrated salt solution). (R3, Fe)

390-R. Silver Alloys With Increased Resistance to Chlorine. (In German.) J. Schatz. *Werkstoffe und Korrosion,* v. 1, June-July 1950, p. 248-249.

How multivalent metals which form a solid solution with Ag (especially Cd, Zn, and Pb) greatly inhibit the progressive formation of AgCl at higher temperatures. (R6, Ag)

391-R. Corrosion in Brewery Fermenting and Storage Vessels. (In German.) H. Netz. *Werkstoffe und Korrosion,* v. 1, June-July 1950, p. 249-250.

Various causes of chemical or electrochemical corrosion of metal containers used in breweries. Possible methods of reducing or eliminating such corrosion. (R7, T29)

392-R. The Principles of Corrosion, Its Forms, Theories, and Methods for Combating It. (In German.) W. Machu. *Werkstoffe und Korrosion,* v. 1, June-July 1950, p. 265-276.

A comprehensive discussion. 18 ref. (R general)

393-R. Rapid Stress-Corrosion Tests. (In German.) F. C. Althof. *Metall,* v. 4, July 1950, p. 267-273.

Experiments were made to test the validity of two proposed rapid tests for sensitivity of Al-Zn-Mg alloys to stress-corrosion. One test uses synthetic sea water at 70° C; the other a 1% NaCl solution at 100° C. Results fail to agree with those obtained from long-time tests. Shows that tensile tests made in corrosive media at room temperature indicate susceptibility to stress-corrosion sufficiently well to be of practical value. 12 ref. (R1, R11, Al)

394-R. Results of Corrosion of High-Pressure Steam Generators on Ships. (In German.) *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, July 11, 1950, p. 560-561.

Causes, results, and methods of preventing such corrosion. (R4, ST)

395-R. Testing Stainless Steels for Susceptibility to Intergranular Corrosion. (In German.) Hans-Joachim Rocha. *Stahl und Eisen,* v. 70, July 9, 1950, p. 608-609.

Literature on above test procedures, which involve treatment with chemical solutions, or anodic surface treatment, to determine indi-

rectly whether or not intergranular corrosion will occur during welding of austenitic or ferritic stainless steels. 14 ref. (R2, SS)

396-R. Influence of Preliminary Oxidation on Corrosion of Cast Irons by Liquid Aluminum and Liquid Light-Metal Alloys Containing Silicon. (In French.) Paul Bastien and Pierre Azou. *Fonderie,* July 1950, p. 2111-2121.

Investigated for cast-iron crucibles (gray cast iron, malleable cast iron, cast iron with 32% Cr, and soft cold-worked steel). Method of investigation. Preliminary oxidation increases considerably the resistance to corrosion by liquid Al and light alloys containing silicon. (R6, CI, Al)

397-R. Caustic Cracking: Stress-Corrosion Tests in Sodium Hydroxide Solutions at Elevated Temperatures. C. D. Weir. *Institution of Mechanical Engineers, Proceedings* (Applied Mechanics Div.), v. 163, W.E.P. No. 55, 1950, p. 18-23; discussion, p. 24-26.

A series of tests on five mild steels made using specially designed apparatus. Hollow specimens were inserted into the base of an autoclave and loaded by means of a lever system, through a push rod inserted in the specimen. This arrangement permitted production of accurate notch-forms on the external surface in contact with the NaOH solutions. It was possible to produce failure of notched specimens rapidly and consistently, but homogeneously stressed specimens were immune. The fractures were intererystalline and typical of those occurring in practice. Dilute solutions were found to be very much less effective than those of high concentration. Neither addition of tannin nor use of fine-grain steels was completely effective in preventing intercrystalline failure. Cathodic polarization was protective while anodic polarization did not prevent, and possibly hastened, failure. 11 ref. (R1)

398-R. Report on Round Table Discussion on General Corrosion Problems. F. L. LaQue. *Corrosion* (Technical Section), v. 6, Oct. 1950, p. 327-331.

Covers session held at NACE conference, St. Louis, Apr. 4-7, 1950. (R general)

399-R. A New Method for the Protection of Metals Against Pitting, Tuberculation and General Corrosion. H. Lewis Kahler and Charles George. *Corrosion* (Technical Section), v. 6, Oct. 1950, p. 331-340.

New method termed the dianodic method, employs a dual treatment with molecularly dehydrated phosphates and chromates over selective pH ranges. Its use in relatively low concentrations gives benefits not obtainable with single treatments at considerably higher concentrations. Pit reductions of 80-90% and more are not unusual. Plant results so far are in complete accord with experimental data. 16 ref. (R10, R2, ST)

400-R. Surface Potential Method of Corrosion Survey of Pipelines. O. W. Wade. Corrosion (Technical Section), v. 6, Oct. 1950, p. 341-343; discussion, p. 343.

Techniques are reviewed. Economics of conducting complete corrosion surveys on bare pipe lines. Economic aspects for determining location of galvanic anode installations vs. regularly spaced installations. (R8, CN)

401-R. Discussions. *Corrosion* (Tech-352.

Covers "Water Side Deterioration of Diesel-Engine Cylinder Liners", F. N. Speller and F. L. LaQue (item 244-R, 1950); "The Behavior of the Chromium-Nickel Stainless Steels in Sulfuric Acid", George C. Kiefer and W. G. Renshaw (item 295-R, 1950); and "Electrochemical Behavior of Zinc and Steel in Aqueous Media", Raymond B. Hoxeng (item 335-R, 1950). (R1, R4, R5, SS, Zn, ST)

402-R. Heat Resistance of Zirconium in Several Mediums. E. T. Hayes, A. H. Roberson, and R. H. Robertson. *Journal of the Electrochemical Society,* v. 97, Oct. 1950, p. 316-323.

Zr sheet was heated in CO, CO_2, H_2, SO_2, C_3H_8, and steam at atmospheric pressure. Weight changes and tensile properties were determined, metallographic structures discussed, and safe heating temperatures for the metal exposed to the various gases deduced. (R9, Zr)

403-R. Properties of Chemical Engineering Materials of Construction. *Industrial and Engineering Chemistry,* v. 42, Oct. 1950, p. 2026-2076.

An extensive tabular presentation compiled from data supplied by authors of preceding review articles on Al alloys; cements; elastomers; synthetic fibers; iron, mild steels and low alloys; Ni and high-Ni alloys; plastics; hard rubber; Sn and Sn alloys; and less common metals. Emphasis is on chemical corrosion resistance, but information is also given on physical, mechanical, thermal, electrical, and optical properties. Use of coding facilitates correlation with last year's tabulation. Source of information is indicated in each case. 219 ref. (R2, P general, Q general)

404-R. Corrosion. Mars G. Fontaña. *Industrial and Engineering Chemistry,* v. 42, Oct. 1950, p. 65A-66A.

Work which shows that steels containing vanadium or exposed to vanadium oxide are subject to rapid oxidation at high temperatures. Results of series of tests on carbon steel, Type 410 stainless, and Cr-V steel. Attack on the carbon and stainless steels was much greater when they were in contact with the Cr-V steel than when they were by themselves.
(R11, CN, SS, AY)

405-R. Corrosion Cracking. U. R. Evans. *Institution of Metallurgists,* "The Fracture of Metals," 1950, p. 68-100.

Chemical, electrochemical, crystallographic, and stress corrosion. Theoretical picture with some practical examples. Suggests methods of prevention. Data for Al, Cu, Ni, and their alloys and for carbon, alloy, and stainless steels. Includes micrographs. 47 ref.
(R1, Al, Cu, Ni, AY, CN, SS)

406-R. Formation of Oxides on Some Stainless Steels at High Temperatures. H. M. McCullough, M. G. Fontana, and F. H. Beck. *American Society for Metals,* Preprint No. 4, 1950, 17 pages.

Describes the continuous weighing apparatus used and the study of the course of oxide growth on Types 304, 430, and 410 steels from 1500 to 1800° F. Dried oxygen, nitrogen, and their mixtures constituted controlled furnace atmospheres.
(R2, SS)

407-R. The Oxidation of Pure Iron. J. K. Stanley, J. von Hoene, and R. T. Huntoon. *American Society for Metals,* Preprint No. 5, 1950, 21 pages.

From 500 to 900° C., and was found to proceed by the common parabolic-rate law. Oxide films were investigated with the Geiger-counter X-ray spectrometer. Metallographic examination made possible resolution of strata. 19 ref. (R2, Fe)

408-R. Mg Gets "Third Degree". *Steel,* v. 127, Oct. 16, 1950, p. 146, 148.

Results of extensive stress-corrosion tests conducted to determine magnesium's suitability for aircraft use. (R1, Mg)

409-R. Oxygen and Carbon-Dioxide Corrosion. Paul Brindisi. *Industry and Power,* v. 59, Sept. 1950, p. 89-91.

Simplified explanation of chemistry of the above as applied to boiler feedwaters. (R4, ST)

410-R. Effectiveness of Molybdenum Disulfide as a Fretting-Corrosion Inhibitor. Douglas Godfrey and Edmond E. Bisson. *National Advisory Committee for Aeronautics,* Technical Note 2180, Sept. 1950, 29 pages.

Six methods of applying MoS_2 to steel were evaluated. Inhibitor action between alloy steel balls vibrating in contact with glass flats was microscopically observed, and the number of cycles required to produce incipient fretting corrosion was noted. Also experiments with steel flats vibrating in contact with each other. Includes micrographs and macrographs. (R1, R10, AY)

411-R. Rapid Oxidation of Metals and Alloys in the Presence of MoO_3. G. W. Rathenau and J. L. Meijering. *Metallurgia,* v. 42, Sept. 1950, p. 167-172.

Experiments in which Cu and heat resisting Cu alloys, Fe and heat resisting Fe alloys, Ni and Ni-Cr alloys, and Ag and Ag-Al were oxidized at elevated temperatures in the presence of MoO_3 and air. MoO_3 promotes oxidation by formation of liquid-oxide phases in which atoms of the basic metal can take part. Owing to incorporation of Mo into the scale, oxidation resistance may be affected below the lowest eutectic. In the case of Ag alloys, MoO_3 plays an additional role, since oxidation of Ag above 180° C. is possible only by complex-oxide formation. (R2, Cu, Fe, AY, Ag)

412-R. Corrosion Problems Arising From the Use of Magnesium Alloys in Service Aircraft. L. F. Lebrocq and H. G. Cole. *Metallurgia,* v. 42, Sept. 1950, p. 173-175.

Previously abstracted from the French; *Métaux & Corrosion.* See item 6D-36, 1949. (R general, Mg)

413-R. Appearance and Interpretation of Stress Corrosion in Malleable Aluminum Alloys. (In German.) H. Vosskühler. *Werkstoffe und Korrosion,* v. 1, Apr. 1950, p. 143-153; May 1950, p. 179-184.

Nature, forms of occurrence, and types of stress-corrosion. Effects of mechanical and chemical test and stress conditions as well as effect of condition of the material. May issue: Effects of heat treatment and aging variations. 30 ref. (To be continued.) (R1, Al)

414-R. New Information on Fluorine Compounds as Wood Preservatives.

True surface areas of metal surfaces as small as 10 sq. cm. were measured with an error of 6% from low-temperature adsorption isotherms using a specially designed vacuum microbalance technique. This method is of special value in determining the average thickness of corrosion films formed by reac-

(In German.) G. Becker. *Angewandte Chemie,* v. 62, Aug. 21, 1950, p. 382-385.

Action of fluorides and fluosilicates on wood-destroying fungi and insects. Since nails, bolts, etc., are often used along with the wood in structures, results of a study of corrosion effects are also presented. 13 ref. (R6, Fe)

415-R. Variation of the Bending Strength of Cast Iron During Long-Time Corrosion Testing. (In German.) Franz Roll. *Neue Giesserei,* v. 37 (new ser., v. 3), Aug. 24, 1950, p. 337-339.

Results of transverse-bending tests made on three different cast irons and one steel exposed to sea water and to the atmosphere for up to 10,000 hr. Apparatus and data. (R3, R4, Q5, CI)

416-R. Clues to Bacterial Corrosion. Frank E. Kulman. *American Gas Association Monthly,* v. 32, Oct. 1950, p. 26, 30.

As applied to ferrous and copper pipes. (R1, ST, Cu)

417-R. Studies of Copper Surfaces by Low Temperature Adsorption Isotherms. T. N. Rhodin, Jr. *Journal of the American Chemical Society,* v. 72, Oct. 1950, p. 4343-4348.

True surface areas of metal surfaces as small as 10 sq. cm. were measured with an error of 6% from low-temperature adsorption isotherms using a specially designed vacuum microbalance technique. This method is of special value in determining the average thickness of corrosion films formed by reaction of gases or liquids with solids. Progressive oxidation of a rough polycrystalline Cu surface decreased the surface area to a point where the roughness factor approached unity. (R2, S15, Cu)

418-R. How Zinc, Aluminum Differ: An Etch Formula for Aluminum Plates. *Modern Lithography,* v. 18, Oct. 1950, p. 57. From material prepared for "Research Progress" published by Lithographic Foundation.

Compares corrosion and surface-active properties of above as applied to lithographic plates. (R5, P10, T9, Al, Zn)

419-R. Rust Formation and the Action of Red Lead; a New Investigation. Manfred Ragg. *Paint, Oil & Chemical Review,* v. 113, Oct. 26, 1950, p. 21-22, 26.

Experimental work in which voltages occurring in a model Fe-C cell were determined as an indication of the magnitude of those which occur in "local cells" during corrosion of iron and steel, and to help clarify the mechanism of action of red lead. The model cell consisted of an iron rod 7.8 mm. in diam. and a carbon electrode immersed in a 0.5% solution of NaCl. In later experiments, a dispersion of red lead was added. (R1, L26, Fe)

420-R. Underground Corrosion Tests on Aluminum Alloys at Wright-Hargreaves Mine. Hugh P. Godard and K. Winslow. *Canadian Mining and Metallurgical Bulletin,* v. 43, Oct. 1950, p. 552-557; discussion, p. 557; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 53, 1950, p. 390-396; discussion, p. 396.

A number of panels of various Al alloys in different combinations and secured by steel and three types of Al rivets were exposed underground at two locations in a Northern Ontario gold mine for two years and then examined to determine the extent of corrosion. Results indicate Alcan 65S-T to possess considerable advantages over 17S-T. (R8, Al)

421-R. Use of a Magnetic Field in Detecting Corrosion Currents. F. Blaha. *Nature,* v. 166, Oct. 7, 1950, p. 607.

When a salt solution is placed on the lower pole of a powerful electromagnet, it rotates clockwise or counterclockwise depending on direction of the field. From velocity of rotation, a rough estimate of strength of the current flowing can be obtained. (R11)

422-R. Temporary Corrosion Preventives for Aviation Uses and Methods of Testing Them. E. W. J. Mardles and J. Mason. *Journal of the Institute of Petroleum,* v. 36, Aug. 1950, p. 475-487; discussion, p. 504-542.

Includes test methods. Results obtained by the Norma-Hoffman Bomb Oxidation Test. (R10)

423-R. American Methods of Testing Temporary Corrosion Preventives. C. F. McCue and E. R. Blane. *Journal of the Institute of Petroleum,* v. 36, Aug. 1950, p. 487-494; discussion, p. 504-542.

A critical review. (R10)

424-R. Performance Tests, Other Than Corrosion Tests, on Temporary Corrosion Preventives. H. Hollis. *Journal of the Institute of Petroleum,* v. 36, Aug. 1950, p. 495-504; discussion, p. 504-542.

Brief details of methods. Tests used for evaluation of protective properties are not dealt with. (R10)

425-R. Investigation of Oxidation and Corrosion Processes on Metal Surfaces With the Aid of Voltage Measurements. (In German.) H. Neuert and H. Hansel. *Zeitschrift für angewandte Physik,* v. 2, Aug. 15, 1950, p. 319-323.

Using Kelvin's method and grad-

ual voltage changes on the surfaces of Al, duralumin, Zn, Fe, and Pb, it was found that Al and duralumin undergo strong and characteristic changes. Shows that this method can be used to study the resistance of metals to gaseous corrosion. Test results obtained in an acid-vapor atmosphere agree with known corrosion behavior of the respective metals. 17 ref. (R2, R9, R11, Al)

426-R. Formation and Effect of Galvanic Currents. (In German.) L. W. Haase. *Werkstoffe und Korrosion,* v. 1, Aug. 1950, p. 297-299.

Evidence which shows that corrosion of metals is often incorrectly blamed on galvanic action. Claims that corrosion is sometimes caused by solution and deposition of one metal on another metal, the other metal being destroyed by action of the resulting local currents. (R1)

427-R. Evans Cells. A Reply to Masing's Remark on the Theory of Corrosion by Local Currents. (In German.) K. Wickert and H. Wiehr. *Werkstoffe und Korrosion,* v. 1, Aug. 1950, p. 299-302.

A few experiments prove that Masing and Evans' opinions can be experimentally disproved even when Evans cells with low electrolytic and external resistance are used. Evans' experimental results are valid only when reactivity of the electrode surfaces is considered. (R1)

428-R. The Effect of Acid and Neutral Phosphate Solutions on Ingot Iron. II. (In German.) H. Grubitsch. *Werkstoffe und Korrosion,* v. 1, Aug. 1950, p. 303-304.

Results of a study of corrosion of iron containing 0.045% C, 0.056% Si, 0.40% Mn, 0.031% S, and 0.015% P in acid and neutral solutions of NaH_2PO_4. (R5, Fe)

429-R. Appearance and Interpretation of Stress Corrosion in Malleable Aluminum Alloys. (Concluded.) H. Vosskühler. *Werkstoffe und Korrosion,* v. 1, Aug. 1950, p. 310-320; Sept. 1950, p. 357-366.

Effects of annealing above the solubility temperature; of alloying additions; of harmful impurities; and of structural anisotropy. Sept. issue: Stress-corrosion caused by electrochemical and mechanical action and by a combination of the two. Distinguishing features of stress corrosion, intercrystalline corrosion and laminar corrosion. (R1, Al)

430-R. Electrochemical Character of Metallic Corrosion in Liquid Dielectrics. (In Russian.) L. G. Gindin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, July 21, 1950, p. 515-518.

Corrosion in a hydrocarbon solution of fatty acids as a typical example of the above. Results obtained with a Fe-Mg element submerged in a 1.5N iso-octane solution of acetic acid indicate that, contrary to usual assumptions, corrosion in a nonelectrolyte nevertheless has an electro-chemical character. (R7, Fe)

431-R. Amalgamation of Aluminum and Its Alloys in the Presence of Water. (In Czech.) Ferdinand Kralik. *Hutnické Listy,* v. 5, Aug. 1950, p. 326-328.

Influence of the liquid Hg phase on spontaneous disintegration of amalgamated Al. This effect is said to be specially important in Al-Zn-Mg and Al-Zn alloys. Shows how the effect can be used to determine the susceptibility of the alloys to intercrystalline corrosion, and for detection of harmful internal stresses. (R2, Q25, C29, Al)

432-R. Stress Corrosion of Magnesium. *Light Metal Age,* v. 8, Oct. 1950, p. 12-13.

See abstract of "Stress Corrosion of Wrought Magnesium-Base Alloys", Hugh L. Logan and Harold Hessing, *Journal of Research of the National Bureau of Standards,* item 175-R, 1950. (R1, Mg)

433-R. Management's Attitude Toward a Corrosion Control Program. R. B. Wilson. *Gas Age,* v. 106, Nov. 9, 1950, p. 38-40, 60.

How Mississippi Power & Light Co.'s corrosion control program was started, what it has accomplished, advantages realized, and what it has cost. (R general, A4)

434-R. Inhibitor in Stick Form Stops Corrosion in Louisiana Gas Well. G. M. Harper, Jr. *Petroleum Engineer,* v. 22, Nov. 1950, p. B54, B56, B58, B61, B64, B66.

Caliper charts taken from tubing-corrosion surveys of the well; also characteristic caliper charts for tubing having no corrosion, mild corrosion, severe corrosion, and very severe general corrosion. Test coupons and water condensate analyses were also used to determine the extent of corrosive conditions. Since severely corrosive conditions were indicated, proprietary organic stick inhibitors were tried and gave excellent results. (R10, ST)

435-R. ASTM Exposure Test Site Program. *ASTM Bulletin,* Oct. 1950, p. 5-9.

Present status of the Society's work on corrosion and deterioration of a wide variety of metallic and nonmetallic materials. Plans for placing ASTM exposure testing on a firm, long-time basis. (R11)

436-R. Corrosion. The Use of Lead in the Pulp & Paper Industry. Vance P. Edwardes. *Paper Trade Journal,* v. 131, Oct. 26, 1950, p. 18-19, 22-23.

Corrosion resistance in contact with various papermaking solutions. (R5, T29, Pb)

437-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 42, Nov. 1950, p. 99A-100A.

Case in which Cb failed to stabilize Type 347 stainless steel. Knifeline intergranular attack occurred immediately adjacent to the welds. Tentative mechanism proposed to explain the situation, based on the effect of temperature on the solid solubility of Cb in 18-8 stainless. (R10, R2, SS)

438-R. Laboratory Corrosion Testing of Chemical-Resistant Paints. R. R. Rogers and W. Dingley. *Finish,* v. 7, Nov. 1950, p. 23-26, 75.

Progress report on Canadian government research program being carried out to obtain performance information on chemical-resistant paints, including a comparison with ordinary paints. Seven commercial paints were applied to steel panels and subjected to various types of exposure. (R11, L26)

439-R. Organic Corrosion Preventive. Charles M. Blair, Jr. *World Oil,* v. 131, Nov. 1950, p. 159-160, 163-164, 166.

Results of using organic corrosion preventives in oil and gas wells. The various types of inhibitors and their specific applications. Methods of introducing the chemicals into the well. Typical case histories. (R10, ST)

440-R. Determination of Current Requirements for Cathodic Protection. Marshall E. Parker. *World Oil,* v. 131, Nov. 1950, p. 253, 256, 258, 260, 264, 267.

Procedure. (R10)

441-R. A Study of Some Metals for Use as Permanent Anodes in Water-Tank Cathodic Protection Systems. A. L. Kimmel. *Corrosion* (Technical Section), v. 6, Nov. 1950, p. 353-358; discussion, p. 358-359.

Since, in water-tank protection systems, ideal conditions do not exist, Faraday's law cannot be used to calculate rate of dissolution of metal. Therefore experiments were made on various commercial metals and alloys used as anodes. These were 99.99% Al, 3S Al, hot-rolled black iron, commercial Ni, monel, Inconel, and Types 302 and 316 stainless steel. (R10, Al, Fe, Ni, SS)

442-R. Design of Anode Systems for Cathodic Protection of Underground and Water Submerged Metallic Structures. E. R. Shepard and Henry J. Graeser, Jr. *Corrosion* (Technical Section), v. 6, Nov. 1950, p. 360-375; discussion, p. 375.

Results of an extensive study of factors involved. (R10)

443-R. A Method of Selecting Protective Coatings for Offshore Drilling Structures. Jack P. Barrett. *Corrosion* (Technical Section), v. 6, Nov. 1950, p. 376-381; discussion, p. 381-383.

Laboratory testing program set up to evaluate protective coatings. To further verify the laboratory results, panels coated with the various painting systems were exposed at a marine location in the Gulf Coast. Correlation was about 90%. Some 30 systems have been tested to date and approximately 60% were totally unsuited for the conditions involved. 20% were of doubtful value, leaving 20% that could be used with more or less effectiveness. (R11, ST)

444-R. Progress Report: The Use of Cathodic Protection in Conjunction With Paint Coatings. W. L. Crosby. *Corrosion* (Technical Section), v. 6, Nov. 1950, p. 383-388.

Corrosion of steel tanks, housing transformers, and network protectors installed in manholes where they are subject to complete or partial salt-water immersion at high tide. Attempts to mitigate this corrosion have led to two main investigations: selection of the best available paint system that can readily be applied; and feasibility of applying cathodic protection in conjunction with this coating. Selection of the best paint system involved laboratory testing of approximately 100 different systems under conditions simulating those encountered in service. The study of cathodic protection in conjunction with a protective coating is still in its initial phases. (R10, R4, ST)

445-R. Deterioration of Diesel Cylinder Liners. F. N. Seller and F. L. LaQue. *Plant,* v. 2, Nov. 1950, p. 38-41.

A peculiar form of corrosion encountered on cast-iron cylinder liners of various types of diesel engines. Suggests possible remedies and urges cooperative research to solve the problem. Ordinary corrosion of liners and crevice corrosion. (R2, CI)

446-R. Adsorbed and Reaction-Product Films on Metals. Herbert H. Uhlig. *Journal of the Electrochemical Society,* v. 97, Nov. 1950, p. 215C-220C.

Effects of gaseous atmospheres on metals, encountered at room and elevated temperatures, during processing, storage, and use. Wetting of iron by mercury, physical adsorption, chemisorption, Cr and the

stainless steels, Cl ions and pitting action of hydrogen, passivation, adsorption vs. reaction, and adsorption of metals on metals. 19 ref. (R2, P13)

447-R. Corrosion of Bare Iron or Steel in Sea Water. J. C. Hudson. *Journal of the Iron and Steel Institute,* v. 166, Oct. 1950, p. 123-136.

Results so far obtained by the Corrosion Committee. Presence of mill scale is shown to promote serious pitting. After removal of mill scale, there is little difference in the corrosion rates of ordinary unalloyed ferrous materials, such as mild steel, ingot iron, or wrought iron. Of a wide range of alloying elements incorporated in a series of low-alloy steels, only two, Cr and Ni, are shown to have any significant effect in reducing corrosion rate. (R4, Fe, CN, AY)

448-R. Intercrystalline Corrosion of Copper-Silicon Alloys Caused by Atmospheric Oxygen. (In German.) Otto Heusler. *Zeitschrift für Metallkunde,* v. 41, Aug. 1950, p. 261-264.

Oxidation of Cu-Si alloys containing 15-40% Si was studied. At higher temperatures, the accumulated heat of reaction may cause spontaneous combustion. Small additions of As, Bi, Ge, Pb, Sn, Tl, or atmospheric moisture accelerate, Be and Zn decelerate, rate of oxidation. The reaction was studied at different temperatures and with addition of 26 different elements. (R2, Cu)

449-R. Observations on the Corrosion of Liquid Pumps. (In German.) W. Katz. *Metalloberfläche,* sec. A, v. 4, Sept. 1950, p. 136.

Case in which Cu was deposited on certain Al bronze pump parts, causing galvanic corrosion, when an impure solution of NaCl and KCl was being pumped. (R1, Cu)

450-R. Corrosion Resistance of Magnesium Alloy Tested. *Iron Age,* v. 166, Nov. 16, 1950, p. 82.

Results of work by National Bureau of Standards on stress-corrosion resistance of six wrought Mg alloys and one clad alloy, in marine and inland atmospheres. (R1, Mg)

451-R. Conservation of Columbium: A Summary of British and American Experience With Stabilized Stainless Steels. *Metal Progress,* v. 58, Nov. 1950, p. 691-708, 742, 744, 746, 748, 750, 752, 754, 756, 758, 760, 762, 764, 766, 768, 774, 776, 778, 780, 782, 784.

In an article, "Conservation of Columbium" in the July issue (item 548-Q) John F. Tyrrell urged the rather general substitution of Ti-stabilized steel (Type 321) for the Cb-stabilized grade (Type 347). Reactions of 56 British and American metallurgists from the industries concerned. Besides comment on Mr. Tyrrell's main thesis, the discussion includes other closely related matters—for instance, the use of stabilized steel in the chemical industries. Information on corrosion resistance, service failures, weldability, melting, and pouring. (R10, T24, T29, SS, Cb, Ti)

452-R. Electron-Diffraction Study of the Nature of Oxidation of Metallic Alloys by Grinding at Different Rates Under Reduced Pressures; Case of an 80-20 Ni-Cr Alloy. (In French.) Robert Courtel. *Revue de Métallurgie,* v. 47, Sept. 1950, p. 700-702; discussion, p. 703.

The samples were ground in vacuum or in a controlled atmosphere. Experimental procedure and results. Diffraction patterns show changes in crystalline phase which take place upon grinding at different rates, temperatures, pressures, and atmospheres. (R2, N5, G18, Ni)

453-R. Law of Oxidation of Metallic Cerium. Generalization to Other Metals. (In French.) Jean Loriers. *Comptes Rendus* (France), v. 231, Sept. 4, 1950, p. 522-524.

Development of a mathematical law in which Ce_2O_3 is first formed and then further oxidized to CeO_2. Weight-increase curves for various temperatures are charted and discussed. Possibility of applying the law to other metals. It has already been applied to uranium and suggested for corrosion of iron by water vapor. (R2, Ce)

454-R. Concerning the Anticorrosive Action of Soluble Cutting Oils; Electrochemical Analysis of Their Protective Action in Water in Combination With Other Inhibitors. (In Italian.) Antonio Ferri. *Metallurgia Italiana,* v. 42, July 1950, p. 261-267.

Experimental results of use in contact with steel. $K_2Cr_2O_7$ was found to be superior to the other inhibitors studied. 18 ref. (R10, ST)

455-R. Alloys Resistant to Hydrochloric Acid. (In German.) B. Waeser. *Werkstoffe und Korrosion,* v. 1, Sept. 1950, p. 345-349.

Reviews work done on HCl-resistant cast irons and other alloys, and points out that for satisfactory results, more research is required. 36 ref. (R5, SG-g, CI)

456-R. New Corrosion-Resistant Materials in Foreign Countries. IV. Low-Iron Copper-Nickel Alloys for Condenser Tubes. (In German.) E. Franke. *Werkstoffe und Korrosion,* v. 1, Sept. 1950, p. 349-357.

Reviews the literature dealing with various types of corrosion and with different corrosion resistant alloys and their properties. 35 ref. (R general, Cu, Ni, SG-g)

457-R. The Effect of Deformation of the Surface Layers of Metal During Oxidation. (In Russian.) P. D. Damkov and P. V. Churaev. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, Aug. 21, 1950, p. 1221-1224.

The phenomenon of torsion of isolated protective oxide layers observed for the first time by Evans and assumed by him to be a direct result of stresses formed during oxidation of the surface layer of metal was investigated. Results obtained for Fe and Mg clearly indicate the presence of the above deformation and make it possible to evaluate its magnitude approximately. (R2, Fe, Mg)

458-R. Activity of Galvanic Cells and Electrochemical Corrosion of Metals by Dielectrics. (In Russian.) L. G. Gindin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Sept. 11, 1950, p. 311-313.

Results of experimental investigation indicate that an ordinary galvanic Mg-Fe cell generates an electric current in a 1.5N iso-octane solution in CH_3COOH. Methods of investigation and results of measurement of emf. The phenomenon indicates that rate of corrosion of metals in dielectrics is determined not so much by their electroconductivity as by solubility of the corrosion products. (R1, P15)

459-R. Industry Girds for Stronger Corrosion Fight. Bill Czygan. *Iron Age*, v. 166, Nov. 23, 1950, p. 85.

New laboratories and exposure racks recently opened by International Nickel Co. at Kure Beach, N. C. (R11)

460-R. Low Temperature Oxidation of Copper. I. Physical Mechanism. T. N. Rhodin, Jr. *Journal of the American Chemical Society*, v. 72, Nov. 1950, p. 5102-5106.

Validity of Mott's hypothesis was evaluated by a study of the oxidation of the cubic face of single crystals of Cu in the range 78 to 335° K. By use of a sensitive quartz vacuum microbalance, actual surface areas were determined from micro-adsorption isotherms. The growth of very thin oxide films was followed with an accuracy of 2%. The rate equation derived from Mott and Cabrera's hypothesis was found to be valid with some limitations for film thicknesses of 5-50A. and temperatures of 78 to 300° K. 14 ref. (R2, Cu)

461-R. Intercrystalline and Other Types of Corrosion of Steam Boilers. R. E. Coughlan, R. C. Bardwell, R. W. Chorley, B. W. DeGeer, T. W. Hislop, Jr., H. M. Hoffmeister, R. W. Seniff, R. M. Stimmel, and J. E. Tiedt. *American Railway Engineering Association Bulletin*, v. 52, Nov. 1950, p. 223-224.

A brief committee report. (R2, ST)

462-R. Methods and Materials for Protection of Underground Pipe Lines. H. E. Graham, R. C. Bardwell, R. W. Chorley, George Clark, R. E. Coughlan, M. W. Cox, C. E. Fisher, A. K. Frost, F. E. Gunning, A. W. Johnson, J. J. Laudig, G. F. Metzdorf, L. R. Morgan, J. Y. Neat, A. R. Nichols, A. B. Pierce, R. W. Seniff, H. M. Smith, and A. G. Tompkins. *American Railway Engineering Association Bulletin*, v. 52, Nov. 1950, p. 225-229.

A committee report. 13 ref. (R10, Fe)

463-R. Corrosion Behavior of Very Dilute Aqueous Solutions. IV. Corrosion of Copper. (In German.) L. W. Haase. *Werkstoffe und Korrosion*, v. 1, Oct. 1950, p. 390-393.

Theories of corrosion of Cu by dilute solutions (including city water). Warm water reacts with Cu to form hydroxides, carbonates, basic chlorides, and sulfates of Cu, which, however—because of their slight solubility—form mostly a protective coating on the Cu. Traces of Cu in water may deposit on other metals and cause galvanic corrosion. Effects of addition of other elements (As, P, Ag). 11 ref. (R5, R4, Cu)

464-R. Rate of Solution of Copper in Different Salt Solutions and Mechanism of Corrosion of Copper. (In German.) W. Katz. *Werkstoffe und Korrosion*, v. 1, Oct. 1950, p. 393-399.

Long-term experiments were made to determine rates of solution of Cu in NH_4Cl, NaCl, KNO_3, Na_2SO_4, Na_3PO_4, and CH_3COONa solutions, of varying concentration. It was found that Cu may dissolve at accelerated, constant, or retarded rates, depending on solvent and time. Mechanism of corrosion; differential behavior of Cu in different solutions was not explained satisfactorily. (R5, Cu)

465-R. Influence of Pigments on the Effectiveness of Coatings as Corrosion Preventives. (In German.) C. Kalauch. *Werkstoffe und Korrosion*, v. 1, Oct. 1950, p. 400-404.

Comparative experiments made to determine the protective effects of inorganic and organic basic pigments in coatings against oxygen-

water corrosion of iron. Tödt's current-time measuring method was used. The mechanism of corrosion of coated metal surfaces explained. 15 ref. (R11, Fe)

466-R. The Effect of Internal Stresses on the Corrosion Process. (In German.) E. Franke. *Werkstoffe und Korrosion,* v. 1, Oct. 1950, p. 404-412.

Reviews literature. The cause and nature of internal stresses; effect of stresses on electrical potential and corrosion rate; effect of surface condition; stress-corrosion in nonferrous metals, iron, and steel; and corrosion fatigue. 201 ref. (R1)

467-R. Formation and Electrochemical Reduction of Oxide Layers on Metals. (In German.) F. Tödt. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 54, Oct. 1950, p. 485-494.

Experiments show that the current density of a galvanic cell (Pt cathode and unpolarized anode) is approximately proportional to the quantity of available oxygen. Similar results obtained with Hg and Cu show that the chemical reaction on cathodically polarized electrodes can be quantitatively determined by measuring the current density. 12 ref. (R2, L17)

468-R. Marine Applications of Cathodic Protection and the Electrocoating Process. Herman S. Preiser and Bennett L. Silverstein. *Journal of the American Society of Naval Engineers,* v. 62, Nov. 1950, p. 881-905.

Principles and applications of cathodic protection. Corrosion and fouling of ships. Practical methods for prevention, also for electrolytic derusting and descaling. Some successful applications of cathodic protection to stationary marine structures. Work in progress and that which should be conducted to determine the feasibility of cathodic protection of ships underway. 58 ref. (R10, T22, ST)

469-R. The Mechanism of the Reaction Between Silver and Sulfur in Mineral Oil. R. T. Foley, W. Morrill, and S. J. Winslow. *Journal of Physical & Colloid Chemistry,* v. 54, Dec. 1950, p. 1281-1292.

Purpose of the investigation was to break down the total tarnishing process into its consecutive steps and to evaluate each step, both theoretically and experimentally. Effects of various factors on the sulfiding rate, including effects of a variety of added compounds. 15 ref. (R2, Ag)

470-R. Philosophy of Paint Exposure Testing. C. A. Lominska. *Official Digest,* Oct. 1950, p. 691-720.

Equipment and procedures of National Lead Co. at their Sayville (N. Y.) exposure station. (R11, L26)

471-R. Ship Bottom Corrosion. Paul Field. *Marine Engineering and Shipping Review,* v. 55, Dec. 1950, p. 64-67.

Pitting corrosion due to velocity; pitting corrosion due to stray currents; pitting corrosion due to galvanic currents; telltale characteristics of galvanic corrosion; galvanic corrosion due to the presence of mill scale; and removal of mill scale. (R2, R1, T22, CN)

472-R. Kinetics of Solid Phase Reactions in Oxide Films on Iron; The Reversible Transformation at or Near 570° C. Earl A. Gulbransen and Roswell Ruka. *Journal of Metals,* v. 188, Dec. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1500-1508.

The forward and reverse reactions, $Fe_3O_4 + Fe \rightleftarrows 4FeO$ were studied by electron-diffraction methods. In thin films, the forward reaction occurs at temperatures 170° C. below the equilibrium value. The mechanism of the forward reaction is shown to be governed by the diffusion of Fe. Studies on the reverse reaction as a function of time, temperature, and oxide composition indicate that nucleation and growth processes are rate controlling. 27 ref. (R2, N1, Fe)

473-R. Performance of Magnesium Anodes Under Actual Service Conditions. T. H. Gilbert. *Gas Age,* v. 106, Nov. 23, 1950, p. 40-41, 67-68.

Current output of Galvo-Pak magnesium anodes is plotted as a function of anode size and soil resistivity. (R10, Mg)

474-R. The Use of Nickel-Containing Alloys in the Pulp and Paper Industry. H. O. Teeple. *Paper Trade Journal,* v. 131, Nov. 9, 1950, p. 28, 30-32; Nov. 16, 1950, p. 19-23; Nov. 23, 1950, p. 14-15, 18-19, 21-25.

Reviews literature on corrosion of Ni alloys in contact with papermaking materials and solutions. Choice of alloys for specific applications. The alloys discussed include not only the Ni-base group, but also the stainless steels and the Ni-alloyed cast irons. 80 ref. (R7, T29, Ni, SS, CI)

475-R. Some Electrical Relations in Galvanic Couples. H. D. Holler. *Journal of Research of the National Bureau of Standards,* v. 45, Nov. 1950, p. 373-380.

Electrical relations are developed for a galvanic couple with and without polarization by externally

applied current. Their significance in the derivation of criteria for cathodic protection. The mechanism of current flow between couples at different potentials is explained. The importance of galvanic-couple theory in governing current distribution over an electrode surface. 17 ref. (R1, R10)

476-R. Heat Exchangers at Fulham Power Station. *Light Metals,* v. 13, Sept.-Oct. 1950, p. 515-518.

Charted data show % weight loss vs. hours of operation for steel, untreated Al, and anodized Al. There was essentially no difference between the last two, but the steel lost 60% of its weight during 12,000 hr. of operation and was unfit for further service, as compared with only 11% loss for the Al. (R2, T1, Al)

477-R. Rust Prevention on Ferrous Materials: Steel. G. P. Acock. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Oct. 1950, p. 539-544; discussion, p. 550-554.

Concerned almost entirely with mild steel. Causes of corrosion, and preventive measures which can be taken. (R general, CN)

478-R. Rust Prevention on Ferrous Materials: Cast Iron. W. Westwood. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Oct. 1950, p. 545-550; discussion, p. 550-554.

Corrosion by the atmosphere "industrial" waters, and soils. Corrosion test results of austenitic cast iron, phosphor bronze, and ordinary cast iron in a variety of chemical solutions (mostly aqueous, but a few nonaqueous). Cathodic protection of pipelines. (R general, CI)

479-R. The Anodic Behaviour of Metals. Part VI. Cobalt. S. E. S. El Wakkad and A. Hickling. *Transactions of the Faraday Society,* v. 46, Oct. 1950, p. 820-824.

The initial build-up of anodic polarization at a cobalt anode over a wide range of conditions was investigated using the cathode-ray oscillograph. In alkaline solutions, three stages of oxidation were distinguished corresponding to the formation of CoO, Co_2O_3, and CoO_2. In passivation of a Co anode, the Co_2O_3 forms a protective layer, essentially 1 molecule thick, which is further oxidized to CoO_2 before oxygen evolution commences. 14 ref. (R1, R10, Co)

480-R. Aluminium Vehicle Maintenance. S. J. Nightingale. *Aluminium Development Association,* "Proceedings at a Symposium on Aluminium in Road Transport", 1950, p. 68-77.

Resistance to corrosion, fluctuating stresses, shock, and abrasion. (R general, Q9, Al)

481-R. Isotopic Exchange Between Cobalt and Tantalum and Their Ions in Solution. (In French.) Maurice Cottin. *Comptes Rendus* (France), v. 231, Oct. 9, 1950, p. 697-699.

Co and Ta were studied as important examples of passive metals or metals readily passivated. The surfaces were polished mechanically and electrochemically. Radioactive Co^{60} obtained from Oak Ridge and Ta^{182} from Harwell (England) were used in contact with series of salts of the metals. Conditions favorable or unfavorable to exchange as revealed by the results are summarized. (R10, Co, Ta)

482-R. Aerobic Microbiological Corrosion of Water Pipes. Parts I and II. Erik Olsen and Waclaw Szybalski. *Corrosion* (Technical Section), v. 6, Dec. 1950, p. 405-414.

Reprinted from *Acta Chemica Scandinavica.* See item 67-R, 1950. (R1, Fe)

483-R. Control of Corrosion by Salt Used for De-Icing Highways. John A. Temmerman and Aaron Sterlin. *Corrosion* (Technical Section), v. 6, Dec. 1950, p. 391-393; discussion, p. 393-394.

Cooperative program which resulted in development of a polyphosphate nitrite-base inhibitor. Laboratory tests indicated it was effective in controlling corrosion by salt brines. Weight-loss data on mild-steel panels are given as a function of inhibitor and salt concentrations. Experiences of Rochester, N. Y., using the inhibitor incorporated in rock salt. (R5, ST)

484-R. Studies of Time-Potential Changes on an Electrode Surface During Current Interruption. I. Zinc-Steel Couple in Synthetic Sea Water. Sigmund Schuldiner and Roger E. White. *Journal of the Electrochemical Society,* v. 97, Dec. 1950, p. 433-447.

A d.c. interrupter method developed for oscilloscopic studies of time-potential changes at an electrode surface during short interruption intervals. Studies were conducted using interruption times of 1-20 microsec. An initial study of polarization phenomena on the Zn anode-steel cathode system in a synthetic sea-water electrolyte was carried out using this method. 17 ref. (R11, R4, Zn, ST)

485-R. Effect of Magnetic Transformation at the Curie Temperatures on Oxidation Rates of Chromium-Iron Alloys. Herbert H. Uhlig and Anton

De S. Brasunas. *Journal of the Electrochemical Society*, v. 97, Dec. 1950, p. 448-452.

Oxidation rates of Cr-Fe alloys containing 9.2-24% Cr were determined in oxygen above and below the Curie temperatures. Plots of logarithms of oxidation rates vs. reciprocal absolute temperatures show discontinuities at the Curie temperatures. In general, activation energies calculated from the oxidation-rate data are higher above the Curie temperatures than below. The data indicate that rate of formation of thin films is controlled by reaction phenomena at the metal-oxide interface. 18 ref. (R2, P12, P16, Fe)

486-R. Studies on Galvanic Couples. III. Polarization and Cathodic Protection. H. D. Holler. *Journal of the Electrochemical Society*, v. 97, Dec. 1950, p. 453-461.

Mechanism of polarization of a galvanic couple. Roles of electrode potentials and of resistive-potential differences in polarization and cathodic protection. Several methods of showing the relation between polarizing current and galvanic-couple potential. Electrical conditions which determine distribution of current flowing to a galvanic couple. (R1, R10, R11)

487-R. A Unified Mechanism of Passivity and Inhibition. Part II. R. B. Mears and R. H. Brown. *Journal of the Electrochemical Society*, v. 97, Dec. 1950, p. 464-466.

Discussion of above paper by R. B. Mears and R. H. Brown. See item 83-R, 1950. (R10, Al)

488-R. Stabilization of Powdered Copper in Relation to Its Corrosion Resistance. (In Russian.) A. I. Levin and A. V. Pomosov. *Zhurnal Prikladnoi Khimii (Journal of Applied Chemistry)*, v. 23, Sept. 1950, p. 949-957.

See abstract of "Hydrophobic Treatment of Metallic Powders for Their Protection Against Corrosion", *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), item 359-R, 1950. (R10, Cu)

SECTION S

INSPECTION and CONTROL

1S. Spectrographic Analysis of Ductile Cast Iron. J. T. Rozsa. *Iron Age,* v. 164, Dec. 22, 1949, p. 73-75.

Spectrographic techniques for rapid, low-cost determination of Mg and Ce. Accuracy and reproducibility obtainable. (S11, CI)

2S. Spectrographic Methods for Determining Magnesium in Nodular Iron. Ford R. Bryan, G. A. Nahstoll, and H. D. Veldhuis. *ASTM Bulletin,* Dec. 1949, p. 69-72.

A spectrographic solution method for analyzing metal rods to be used as standards for the control analysis. A technique for determining Mg as a part of the customary spectrographic analysis of cast iron rods or pins. (S11, CI)

3S. Bath Temperature Measurements. J. G. Mravec. *Blast Furnace and Steel Plant,* v. 37, Dec. 1949, p. 1447-1450.

Methods for measuring the temperature of molten steel. (S16)

4S. Application of Ultrasonic Testing to Steel Plant Metallurgical Control. J. V. Russell. *Non-Destructive Testing,* v. 8, Fall 1949, p. 7-11.

History, fundamentals, and general applications. Metallurgical applications and procedures. 15 ref. (S13)

5S. General Material, Process and Quality Control by Non-Destructive Testing. Milfred J. Parker. *Non-Destructive Testing,* v. 8, Fall 1949, p. 15-17.

Equipment, procedures, and applications. (S general)

6S. Ultrasonic Testing. Donald Erdman. *Non-Destructive Testing,* v. 8, Fall 1949, p. 28-30.

Recent developments. (S13)

7S. Non-Destructive Testing and Inspection as Based on Factory and Field Operations. Kenneth E. Rush. *Non-Destructive Testing,* v. 8, Fall 1949, p. 30-32.

Dimensional inspection; superficial inspection; miscellaneous inspection; and physical properties of parts. (S general)

8S. Radiography With Cobalt-60. Adair Morrison. *Nucleonics,* v. 5, Dec. 1949, p. 19-32.

Graphs, from which exposure times for a range of thicknesses of steel and for different types of films can be determined. Information useful in handling and shipping of cobalt-60. 11 ref. (S19, S13, Co)

9S. Fixed Gages—Their Design, Application, and Use. F. Steele Blackall. *Instruments,* v. 22, Dec. 1949, p. 1149-1151.

Use of fixed gages, with consideration to design of precision gage blocks; plain cylindrical, linear, and width gages (plug gages, ring gages, snap gages, length gages); thread gages); and special gages (taper gages, spline gages, contour gages, flush pin gages, functional gages). (S14)

10S. Recent Developments—Measurement of Metal Thickness From One Side. Dwight J. Evans. *Petroleum Refiner,* v. 28, Dec. 1949, p. 109-112.

Electronic instrument which operates on the ultrasonic resonance principle. It has a range of 1/16 to 12 in. of steel. (S14)

11S. High-Temperature Thermocouple. New Metal Combination Measures up to 2200° C. Walter C. Troy and Gary Steven. *Frontier,* v. 12, Dec. 1949, p. 6-8, 22-24.

See abstract of "The Tungsten-Iridium Thermocouple for Very High Temperatures", *American Society for Metals,* Preprint, item 13-58, 1949. (S16)

12S. The Polarograph in Zinc-Base Die Casting Metal Analyses. E. G. Ford. *Canadian Chemistry and Process Industries,* v. 33, Dec. 1949, p. 1051-1054, 1060.

Procedures and applications of polarographic technique, which enables a laboratory which does not have a spectrograph to make accurate high-speed determinations. (S11, Zn)

13S. Piston Assemblies; A Review of Operating Results in Road Transport Oil Engines. J. L. Hepworth. *Automobile Engineer,* v. 39, Dec. 1949, p. 528-534. (Condensed version in *Engineering,* v. 168, Dec. 9, 1949, p. 629-632.)

Means for avoidance of piston failures. Limiting factors of piston life as indicated by oil consumption. Rates of wear of the various components of the piston assembly. Service test results with different piston-ring materials; improved materials; design suggestions. (S21, Q9, T25)

14S. Inspection and Testing. *Steel,* v. 126, Jan. 2, 1950, p. 184, 186, 188.

Brief reviews and forecasts: Sonic Testing Training Expensive but Worthwhile, R. W. Snowdon. Analysis of Several Elements at Once Ultimate Objective, M. A. Cordovi. Industry to Benefit by Scientific Quality Control, J. R. Steen. Nondestructive Testing Seen Invaluable to Production, F. B. Doane. Sees Wider Usage of X-Ray Gage During 1949, W. C. Hutchins. Nondestructive Testing Aimed at Preventing Scrapped Parts, Leslie W. Ball. Industrial Research Aims at Lower Costs, Better Quality, Arthur E. Focke. Volume of Spectrographical Work Boosted by Research, W. B. Coleman. Instrument Production Revives in Europe, George Scherr. Use of New Pyrometer Results in Better Quality Castings, J. Manuele. (S general)

15S. Heat-Conduction Errors in Temperature Measurements. L. E. Smith. *Transactions of the American Society of Mechanical Engineers,* v. 72, Jan. 1950, p. 71-76.

Various thermometer-bulb assemblies used. Experimental magnitude of the heat-conduction error possible in media with low and high heat-transfer coefficients and in a medium with a high heat-transfer coefficient (water). Effect of heat-conduction error on the over-all response in simulated practical installations. (S16)

16S. A Better Way To Assay Cyanide Mill Solutions. A. Kenneth Schellinger. *Engineering and Mining Journal,* v. 151, Jan. 1950, p. 74-75.

New method, using test lead and HCl, takes only 20 min., increases accuracy, and uses lower cost materials. (S11)

17S. Photoelectric Colorimetry. Raffaele F. Muraca. *Plating,* v. 37, Jan. 1950, p. 53-58, 68.

The development, construction, and principle of operation of photoelectric colorimeters used in analysis of a wide variety of materials. (S11)

18S. The Design and Construction of Sensitive Fluorophotometers. Part I. Principles. G. R. Price. *U. S. Atomic Energy Commission,* AECD-2677, Apr. 1948, 18 pages.

For uranium analysis. Design stresses convenience in operation rather than economy in construction. (S11, U)

19S. Gas Temperature Measurement Above 1500° C. R. Mayorcas. "Proceedings of the Seventh International Congress for Applied Mechanics", v. 3, 1948, p. 310-312.

Previously abstracted from *Journal of the Institute of Fuel.* See item 13-53, 1949. (S16)

20S. X-Ray Thickness Gauge for Cold-Rolled Strip Steel. W. N. Lundahl. *Transactions of the American Institute of Electrical Engineers,* v. 67, Part I, 1948, p. 83-90.

Previously abstracted from condensed version in *Electrical Engineering.* See item 12a-47, 1948. (S14, F23, ST)

21S. Electronic Circuits of a Supersonic Reflectoscope. Ralph B. DeLano, Jr. *Transactions of the American Institute of Electrical Engineers,* v. 67, Part I, 1948, p. 128-132.

Circuits and their operation with raw a.c. power. The device is used for nondestructive testing and measuring of solid parts. (S13)

22S. An X-Ray Thickness Gauge for Hot-Strip Rolling Mills. C. W. Clapp and R. V. Pohl. *Transactions of the American Institute of Electrical Engineers,* v. 67, Part I, 1948, p. 620-626.

X-ray theory of gaging. Operating performance of gage, safety considerations, and other applications. (S14, F23)

23S. Measuring the Temperatures of Molten Metal. (In German.) Kurt Guthmann. *Archiv für Technisches Messen,* Nov. 1949, p. T96-T98 (6 p.)

Surveys the literature. Methods and equipment. 21 ref. (S16)

24S. Photometric Rapid Processes in the Foundry Laboratory. (In German.) Hans Pinsl. *Neue Giesserei,* v. 36 (new ser., v. 2), Dec. 1949, p. 380-386.

Procedure for determining constituents and impurities in pig and cast iron and in alloy steels. How several elements can be analyzed by

the above method in one operation. 17 ref. (S11, CI)

25S. Measuring the Wall Thicknesses of Light-Metal Cast Parts with Dr. Forster's "Sondenkawimeter" (Special Thickness Measuring Device). (In German.) Ph. Schneider. *Metall,* v. 3, Oct. 1949, p. 321-326.

Design and use of a new electromagnetic instrument. Effect of various factors on readings of the instrument. Typical data. (S14)

26S. Analytical Errors Caused by Heterogeneous Composition and by Impurity Inclusions. (In German.) O. Niezoldi. *Archiv für Metallkunde,* v. 3, Oct. 1949, p. 341-343.

Despite careful sampling, analytical results may not give average composition. Author recommends giving the analyst more information to aid in selection of technique and interpretation of results. (S11)

27S. X-Ray Method for Determination of Coating Thicknesses by a Superposition Method. (In Russian.) L. S. Polatnik. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Sept. 1949, p. 1043-1054.

New methods that may be extended to cases in which coating or lining contains complex chemical compounds, whose structure is unknown, solid solutions consisting of light and heavy elements, or mixtures of several uniformly distributed phases. As an example, the method was applied to determination of the thickness of a layer of Fe_3O_4 on oxidized steel. 15 ref. (S14)

28S. Investigation of the Effect of Arcing and of Third Elements During Spectrographic Analysis. II. Investigation of the Nature of the Influence of Third Elements. (In Russian.) L. N. Filimonov. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Oct. 1949, p. 1178-1193.

Experimental results indicate that "third elements" cause an exchange reaction between components of the alloy and their oxides in the process of oxide-film formation, which commences and then ceases during arcing. Method of investigation and data obtained. (S11)

29S. Methods of Spectroscopic Analysis of Ferro-Alloys. (In Russian.) M V. Babaev. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Oct. 1949, p. 1193-1197.

Existing methods and hints for improvement, particularly with respect to determination of Si in high-Si ferrochromium. (S11, Fe)

30S. Magnaflux Inspection of Welded Storage Tanks. F. A. Upson. *Welding Journal,* v. 29, Jan. 1950, p. 27-30.

Optimum procedure. Surface finishing, spacing of prods, thickness of material, amount of powder, etc. Limitations of the method. (S13)

31S. Rapid-Responding Devices Control High-Speed Reheating of Seamless Steel Tubes. H. W. Cox. *Steel,* v. 126, Jan. 16, 1950, p. 64-66, 68.

Successful regulation of new high-gradient heating process at National Tube's Gary plant is made possible by use of radiation pyrometers. (S16, F26)

32S. Installation and Maintenance of Pyrometers for the Heat Treatment Shop. G. Oestereich. *Engineers' Digest,* v. 10, Dec. 1949, p. 433-434. Translated and condensed from *Werkstatt und Betrieb,* v. 82, Oct. 1949, p. 367-369.

Apparatus and circuits. Recommended procedures. (S16, J general)

33S. Radiography With Beta-Rays. Torbjörn Westermark. *Nature,* v. 164, Dec. 24, 1949, p. 1086-1087.

Some examples, characteristics and advantages. (S13)

34S. The Life Testing of Engine Components. S. T. Harrison. *Metal Industry,* v. 75, Dec. 23, 1949, p. 535-538. Equipment and procedures used for testing various components of British aircraft gas turbines. (S21, Q general)

35S. Comparison Measurement of Slip Gauges Using an Anvil of Transparent Material. A. W. Musk. *Machinery* (London), v. 75, Dec. 29, 1949, p. 919-924.

Investigation to determine the best method of supporting the slip gage during test when using high-magnification comparators. The flat, grooved, hardened-steel anvil; the three-ball support; and the annulus-type of support have all been tried. New type of anvil developed. (S14)

36S. Apparatus for Determination of Variation of Wall Thickness of Tubes. (In Russian.) G. S. Ratushev and B. F. Sevastyanov. *Stanki i Instrument* (Machine Tools and Equipment), v. 20, Sept. 1949, p. 26.

Mechanical gaging apparatus. (S14)

37S. Application of Models to Unipolar Induction Problems in Electromagnetic Inspection. (In Russian.) V. V. Vlasov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 69, Nov. 1, 1949, p. 37-40.

Theoretical and experimental investigation of the possibility of using models instead of extremely complex mathematics to work out problems. Applied mainly to defects in metallic objects. (S13)

38S. (Book) **Modern Instrumental Analysis. Vol. 1.** David F. Boltz, Editor. 191 pages, 1949. Edwards Brothers, Inc., Ann Arbor, Michigan.

Quantitative spectrochemical analysis, application of spectrochemical analysis, mass spectrometry, optical instruments, electron diffraction, and X-ray diffraction. (S11)

39-S. What You Should Know About Electrographic Testing. *Steel,* v. 126, Jan. 23, 1950, p. 56-60, 76.

Recent developments in electrographic methods for identifying metals, alloys, and inclusions, and for testing porosity in organic and metallic coatings. (S10, S15)

40-S. Identification of Metal Plate Deposits. *Materials & Methods,* v. 31, Jan. 1950, p. 83.

Presented in outline form. (S10, L17)

41-S. Examination of Surfaces; Permanent Records by Use of Negative Reproduction of Surfaces by Plastic Castings. John W. Sawyer. *Journal of the American Society of Naval Engineers,* v. 61, Nov. 1949, p. 819-827.

Techniques. (S15)

42-S. Radiography in the Steel Foundry. Richard M. Landis. *American Foundryman,* v. 17, Jan. 1950, p. 58-61.

An illustrated survey. (S13, CI)

43-S. New Methods for Determining Phosphorus in Steels. *Steel,* v. 126, Jan. 30, 1950, p. 46-49, 56, 59.

Spectrographic method using Geiger photo-electron tubes recently adopted for production control at Ford Motor Co. A single determination can be made in 2 min. Refinements in chemical techniques are also reported. 12 ref. (S11, ST, P)

44-S. Routine X-Ray Inspection Speeds Production of Large Welded Pressure Vessels. *Steel,* v. 126, Jan. 30, 1950, p. 59.

(S13, T26)

45-S. New Yardstick Accurately Gages Surface Finish. *Modern Industry,* v. 19, Jan. 15, 1950, p. 99-100.

Surface-finish standards made by General Motors from a gold-plated master. (S15)

46-S. Photo-Electric Exposure Meter for Industrial Radiography. D. T. R. Dighton and R. H. Herz. *Journal of Scientific Instruments and of Physics in Industry,* v. 26, Dec. 1949, p. 404-407.

Meter using a multiplier photocell in conjunction with two different types of fluorescent screens. (S13)

47-S. Chromium and Manganese in Steel and Ferro-Alloys; Simultaneous Spectrophotometric Determination. James J. Lingane and Justin W. Collat. *Analytical Chemistry,* v. 22, Jan. 1950, p. 166-169.

The method of Silverthorn and Curtis was re-examined to determine whether the empirical calibration with standard steel samples is necessary. A study of the various optical and chemical factors demonstrates that Beer's law is obeyed and that Mn and Cr contents can be computed from the densities observed at two appropriately chosen wave lengths. Corrections are established for the effect of other elements commonly present in ferro-alloys. (S11, ST, Fe, Cr, Mn)

48-S. White Magnetic Fluid; A New Development in Magnetic Crack Detection. *Iron and Steel,* v. 23, Jan. 1950, p. 12.

(S13)

49-S. Split Thermocouples. A. Searby. *Journal of the Iron and Steel Institute,* v. 164, Jan. 1950, p. 36.

A method for continuous measurement of liquid-steel temperatures in which the thermocouple elements are led through the furnace lining into the metal at some distance apart, the molten charge thus completing the circuit and acting as the "hot junction". Despite certain advantages, laboratory investigation shows that use of Pt/Pt-13% Rh thermocouples without suitable protection from the molten metal is not practicable. (S16, ST)

50-S. A Wire-Drawing-Die Profilometer. R. M. J. Withers. *Journal of the Iron and Steel Institute,* v. 164, Jan. 1950, p. 63-66.

Instrument designed to measure and reproduce profiles of the bore of wire-drawing dies. It is intended for use with die bores with throat diameters of 0.02-0.25 in., and can also be used to measure bore diameter. Limit of measurement is 0.0001 in. (S15)

51-S. Bath Temperature Measurements. J. G. Mravec. *American Iron and Steel Institute,* "Technical Committee Activities", 1949, p. 172-182.

Importance of temperature control in melting of steel. History of bath pyrometry. Immersion blowing-tube pyrometers and thermocouples. (S16, D general)

52-S. Radioactive Isotopes as Tracers in Steel Industry Research. James P. Graham. *American Iron and Steel Institute,* "Technical Committee Activities", 1949, p. 264-277.

Methods of detecting and measuring nuclear radiation. Various metallurgical applications. Tracer study

of sulfur during the coking of coal. 15 ref. (S19, ST)

53-S. Advances in Combustion Control in Pacific Coast Plants. R. S. Coulter. *American Iron and Steel Institute,* "Technical Committee Activities", 1949, p. 307-317.
(S16, ST)

54-S. The Practical Meaning of Mechanical Test Results. O. A. Klein. *American Iron and Steel Institute,* "Technical Committee Activities", 1949, p. 357-369.
Tests for predicting satisfactory service from samples of steel. Some possible changes in steel specifications. (S21, ST)

55-S. Inside Out. O. A. Battista. *Steelways,* v. 6, Jan. 1950, p. 24-26.
Use of X-rays for inspection of wide variety of materials and finished products. (S13)

56-S. High-Speed Reheating of Seamless Steel Tubes; Radiation Pyrometers Make Possible Successful Control of New High-Gradient Heating Process. H. W. Cox. *Instrumentation,* v. 4, 4th qtr. 1949, p. 3-6.
(S16, SS)

57-S. Design and Application of Thermocouples for Specific Needs. C. R. Bingham and C. C. Roberts. *Instrumentation,* v. 4, 4th qtr. 1949, p. 25-27.
(S16)

58-S. Tungsten-Iridium Thermocouple for Temperatures Above 2900° F. *Iron Age,* v. 165, Feb. 2, 1950, p. 92. Condensed from "The Tungsten-Iridium Thermocouple for Very High Temperatures", Walter C. Troy and Gary Steven.
Previously abstracted from *American Society for Metals,* Preprint No. 19, 1949. See item 13-58, 1949.
(S16, SG-a)

59-S. The Tin-Fusion Method for the Determination of Hydrogen in Steel. Dennis J. Carney, John Chipman, and N. J. Grant. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Feb. 1950, p. 397-403.
Improved system developed solely for hydrogen analysis. Routine 15-min. analyses are standard. Precision of ± 0.1 ppm. for a 2 g. sample is attained. 14 ref. (S11, ST)

60-S. The Sampling and Analysis of Liquid Steel for Hydrogen. Dennis J. Carney, John Chipman, and N. J. Grant. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Feb. 1950, p. 404-413.
An absolute calibration for sampling and analyzing liquid steel for hydrogen based on Sievert's values of solubility in iron. Further checks were made in Ni, Fe-Ni, and 18-8 stainless melts. The sampling method was successfully applied to a large number of commercial steel melts in various types of furnaces. 30 ref.
(S11, ST)

61-S. An Optical Pyrometer Employing an Image-Converter Tube for Use Over the Temperature Range 350°-700° C. C. R. Barber and E. C. Pyatt. *Journal of Scientific Instruments,* v. 27, Jan. 1950, p. 4-6.
(S16)

62-S. A New Heat-Flow Meter. H. Stafford Hatfield and F. J. Wilkins. *Journal of Scientific Instruments,* v. 27, Jan. 1950, p. 1-3.
Meter consists of a small disk of Te-Ag alloy with Cu gauze coating on its two sides. This is placed with its plane at right angles to the flow of heat to be measured, creating a small proportionate difference of temperature between the two sides. The disk is connected by fine wires through a terminal block to a galvanometer which registers the thermal e.m.f. due to difference in temperature of the two Te-Cu junctions.
(S16)

63-S. Many New and Revised Standards on Steel, Nickel Alloys, Non-Ferrous Metals, Cast Iron, Rubber Products and Test Methods. *ASTM Bulletin,* Jan. 1950, p. 14-17.
Summarizes actions of ASTM Standards Committee at Dec. 1949 meeting. (S22)

64-S. Operating Principles of Various Temperature Measuring Devices. *Product Engineering,* v. 21, Feb. 1950, p. 138-139.
Presented in outline form with schematic diagrams. (S16)

65-S. Applications of Statistical Methods in Metallurgy. (In French.) Georges Darmois. *Revue de Métallurgie,* v. 46, Nov. 1949, p. 713-715.
Importance of statistics in metallurgy as a method for qualitative and quantitative determination of metal properties. A typical determination using statistics combined with theory of probability. (S12)

66-S. Application of Methods of Statistical Control in Spectrographic Analysis. (In French.) Robert Girschig. *Revue de Métallurgie,* v. 46, Nov. 1949, p. 719-726.
Usefulness of the above on an industrial and laboratory scale.
(S11, S12)

67-S. Statistical Representation in Form of Diagrams of the Results of Mechanical Tests on Drawn or Rolled Light Alloys. Importance of These Diagrams for the Producer and Consumer. (In French.) M. Renouard. *Revue de Métallurgie,* v. 46, Nov. 1949, p. 727-734.

Technique and method of utilization of the obtained diagrams. (S12, Q general, Al)

68-S. Application of Statistics in Heavy Industry. (In French.) A. W. Swan. *Revue de Métallurgie,* v. 46, Nov. 1949, p. 735-754.

Theoretical bases of the methods, technique of application, and typical results obtained on application to some problems in steelmaking and primary fabrication. (S12)

69-S. Application of Spectroscopic Analysis to Al-Zn-Mg Alloys (Ergol). (In Italian.) T. Nuciari. *Alluminio,* v. 18, Sept.-Oct. 1949, p. 476-480.

Conditions for determination of Zn, Mg, Cu, Fe, Si, Mn, Cr, and Ti. Results are compared with those obtained by chemical analysis. (S11, Al)

70-S. Ultrasonic Defect Detector for the Non-Destructive Testing of Materials. (In German.) Herbert Krautkrämer, Josef Krautkrämer, and Otto Rüdiger. *Archiv für das Eisenhüttenwesen,* v. 20, Nov.-Dec. 1949, p. 355-358.

Instrument that records graphically even small defects in different types of metal. Examples of possible uses. 10 ref. (S13)

71-S. Immersion Thermocouple in French Steel Plant. R. J. Castro. *Metal Progress,* v. 57, Feb. 1950, p. 210.

Technique of use of Pt/Pt-Rh couple. (S 16)

72-S. Thermocouples of the Refractory Metals. F. Haydn Morgan and W. E. Danforth. *Journal of Applied Physics,* v. 21, Feb. 1950, p. 112-113.

Thermo-electric power of several refractory thermocouples was investigated: W-Ta up to 3000° C., W-Mo up to 2600° C., Ta-Mo up to 2600° C., and W-W/Mo (alloy 50% Mo/50% W) up to 2900° C. Basic calibration was carried out using several melting points and results were verified and interpolated by means of an optical pyrometer. The W-Ta and W-Mo couples were applied to temperature measurement in high-temperature vacuum furnaces and to determinations of spectral emissivity. (S16, EG-d)

73-S. Neutron Spectroscopy for Chemical Analysis. II. Resonance Effects, Transmission in the 1/v Region. W. W. Havens, Jr., and T. I. Taylor. *Nucleonics,* v. 6, Feb. 1950, p. 66-77.

Examples illustrate application and limitations of the methods described. 12 ref. (S11)

74-S. Evaluating Casting Finishes. H. H. Fairfield and James MacConachie. *American Foundryman,* v. 17, Feb. 1950, p. 47-48.

Inspection and test methods. Set of surface-finish specimens made by precision casting. (S15)

75-S. Standards and the Tool Engineer. L. B. Bellamy. *Tool Engineer,* v. 24, Feb. 1950, p. 24-25.

Various standardization activities of ASTE. (S22)

76-S. Flux Densities for Magnetic Particle Inspection. T. E. Hamill. *Welding Journal,* v. 29, Feb. 1950, p. 105-114; discussion, p. 114-115.

Method for determining the flux density of steels magnetized with direct current. Practical application to a tube section shows the relation between flux density vs. depth values and current required to locate artificial defects at various depths below surface, when magnetized by direct and indirect methods. (S13, ST)

77-S. A New Method for Surface-Temperature Measurement. Nobuji Saski. *Review of Scientific Instruments,* v. 21, Jan. 1950, p. 1-3.

The method makes use of a thermocouple whose measuring junction can be adjusted to any temperature. The temperature of the junction indicated by a millivoltmeter in the couple circuit is also the temperature of the surface, if the junction temperature is adjusted for no deflection upon light, brief contact with the surface. (S16)

78-S. A Temperature-Controlled Resistance Furnace for High Temperature Measurements. W. G. Schneider and N. R. S. Hollies. *Review of Scientific Instruments,* v. 21, Jan. 1950, p. 94-95.

Furnace and control system designed to maintain a platinum gas pipet at a uniform temperature to within 0.05° C. over a working temperature range from 600 to 1200° C. (S16)

79-S. Alloy Steel Castings; The Need for Further Standard Specifications. R. T. Rolfe. *Iron and Steel,* v. 23, Feb. 1950, p. 49-50.

British viewpoint. (S22, AY, CI)

80-S. Analysis by Nuclear Transformation. (In German.) Wolfgang Riezler. *Zeitschrift für Naturforschung,* v. 4a, Oct. 1949, p. 545-549.

Since the half-life of induced radioactivity in metals is proportional to the relative quantity of the constituents in a given metal, irradiation

of the metal with neutrons or rapid deuterons permits a nondestructive method of quantitative analysis. The method is especially sensitive in the analysis of Al for Si and Na, the degree of accuracy being as high as ±0.001%. (S11, Al)

81-S. Comparison of the Variable-Density and Line-Width Processes of Quantitative Spectrochemical Analysis. (In German.) Walter Rollmagen and Hildegard Weltz. *Zeitschrift für Naturforschung,* v. 40, Nov. 1949, p. 570-573.

The line-width process is preferable when one of the lines shows a strong "self-reversal"; but in all other cases, it is superior only when the characteristics of the photographic plate cannot be closely controlled. (S11)

82-S. Detection of Surface Films by Means of Electron Interference. (In German.) Heinz Raether. *Zeitschrift für Naturforschung,* v. 40, Nov. 1949, p. 582-587.

Experiments with Zn and Al were made to show that the possibility of detecting surface films—and of measuring their thicknesses with a fair degree of accuracy—depends upon the surface smoothness of the metals. 23 ref. (S15, Zn, Al)

83-S. Chromatographic Extraction and Radiographic Identification of Platinum Metals. (In German.) Georg-Maria Schwab and Amelendra Narayan Ghosh. *Zeitschrift für anorganische Chemie,* v. 258, May 1949, p. 323-331.

Investigated on an Al_2O_3 column. The extraction of Ir, Pt, Pd, and Rh, which are adsorbed in this order, was radiographically determined by measuring the lattice constants of the extracted metals, confirming the results indicated by the colors of the various zones in the column. The method is suited to separation of Pt metals from other metals (exception Fe). 11 ref. (S11, EG-c)

84-S. (Book) **Handbook of Industrial Radiology. Ed. 2. 1949.** J. A. Crowther, editor. Edward Arnold Co., London. 21s. Incorporates many revisions and additions to first edition, published five years ago. No new information is forthcoming concerning the use of new sources of gamma radiation in radiography although mention is made of the probability of such sources becoming available. A table of absorption coefficients is added as an appendix. (S13)

85-S. (Book) **Cross Index of Bar Stock Specifications. 1949.** National Screw Machine Products Assn., 13210 Shaker Square, Cleveland 20, Ohio. $1.00.

A correlation of bar stock specification numbers of the following groups: Society of Automotive Engineers; Army & Navy Aeronautical Specification; Army; National Emergency; Federal; American Iron & Steel Institute; Aeronautics Div. of the Society of Automotive Engineers; Navy; and American Society for Testing Materials. (S22)

86-S. Ferrous Metallurgy. H. F. Beeghly. *Analytical Chemistry,* v. 22, Feb. 1950, p. 235-238.

Reviews recent literature on analysis of ferrous metals. 95 ref. (S11, Fe)

87-S. Nonferrous Metallurgy. H. V. Churchill. *Analytical Chemistry,* v. 22, Feb. 1950, p. 238-240.

Reviews recent literature on analysis of nonferrous metals. 111 ref. (S11, SG-a)

88-S. Determination of Oxygen in Titanium. Dean I. Walter. *Analytical Chemistry,* v. 22, Feb. 1950, p. 297-303.

Modified vacuum-fusion techniques. The sample to be analyzed reacts with powdered graphite, in the presence of tin, to form the stable carbide of titanium and reduce the oxides. The evolved gases are extracted and analyzed. (S11, Ti)

89-S. Radiometric Determination of Gold and Rhenium. Edward D. Goldberg and Harrison Brown. *Analytical Chemistry,* v. 22, Feb. 1950, p. 308-311.

Methods developed for determination of Au and Re using slow-neutron activation analysis. 12 ref. (S11, Au, Re)

90-S. Vacuum Fusion Furnace for Analysis of Gases in Metals. W. G. Guldner and A. L. Beach. *Analytical Chemistry,* v. 22, Feb. 1950, p. 366-367.

Furnace of radically modified design which has been used on a variety of metals and alloys for the past two years. (S11, EG-m)

91-S. The Radiographic Inspection of Welds as Applied in the Shipbuilding Industry. L. Mullins. *Sheet Metal Industries,* v. 27, Feb. 1950, p. 151-158, 162.

Scope, costs, training, equipment, safety precautions, technique, interpretation, and reporting procedures. (S13, T22, ST)

92-S. Radium, Tantalum^{182}, and Cobalt^{60} in Industrial Radiography. James W. Dutli, Gerold H. Tenney, and John E. Withrow. *U. S. Atomic Energy Commission,* AECD-2719 (LADC-712), Sept. 23, 1949, 10 pages.

Use of Ta^{182} and Co^{60} as sources of

radiation was investigated and compared with Ra. Technique charts were developed for thicknesses up to 3 in. for Al, Zn, Fe, Sn, Cu, and Pb. Resolution, sensitivity, and half-life values were compared.
(S13, Al, Zn, Fe, Sn, Cu, Pb)

93-S. Automatic Control of Electrodes in Arc Furnaces. G. Reginald Bashforth. *Metallurgia,* v. 41, Jan. 1950, p. 153-154.
Two types of regulators and their applications. (S18)

94-S. Sound Testing Searches Out Rail Defects Within Limits of Joint Bars. H. C. Drake. *Railway Age,* v. 128, Mar. 4, 1950, p. 55-58.
Car-mounted ultrasonic reflectoscope which discloses bolt-hole breaks, head-and-web separations, and other failures rapidly without necessity of dismantling rail-end assemblies.
(S13, T23)

95-S. On the Determination of the Roughness of Metallic Surfaces. Carl Wagner. *Journal of the Electrochemical Society,* v. 97, Mar. 1950, p. 71-74.
Polarization capacity of an electrode can be measured readily with the aid of a ballistic galvanometer. The polarization capacity per unit apparent area is approximately proportional to the roughness of the electrode surface. Results obtained for silver electrodes illustrate the influence of pretreatment and aging. 38 ref. (S15)

96-S. How To Determine Oxygen in Metals by Fast Vacuum Fusion Method. R. K. McGeary, J. K. Stanley, and T. D. Yensen. *Steel,* v. 126, Mar. 6, 1950, p. 80-82, 118.
See abstract of *American Society for Metals,* Preprint 10, item 10A-130, 1949. (S11, O)

97-S. Light Rays Can Be Tools. (Concluded.) A. R. Fultz. *Tool & Die Journal,* v. 15, Mar. 1950, p. 47-51, 100.
Optical gaging devices. (S14)

98-S. How Ford Applies Statistical Quality Control. *Production Engineering & Management,* v. 25, Mar. 1950, p. 51-54.
(S12)

99-S. Instantaneous Quality Control: New Method of Reducing Manufacturing Costs. *Steel,* v. 126, Mar. 13, 1950, p. 99-100.
Electric computor called a "quality-control indicator", which keeps an automatic, continuous check on reject rates in manufacturing operations. (S12)

100-S. Red Means Danger. Rebecca H. Smith. *Western Machinery and Steel World,* v. 41, Feb. 1950, p. 70-72.
"DPM" (dye penetrant method) for surface-defect detection, developed and used on gas-turbine parts. (S13)

101-S. Versatile X-Ray Intensity Meter. William B. Lurie. *Electronics,* v. 23, Mar. 1950, p. 74-77.
Device permits rapid exploratory measurements, continuous monitoring, or work involving a large number of readings within a short time. Detector probe may be carried by hand for portable applications or permanently mounted for gaging thin materials during production. Typical applications. (S14)

102-S. Spectrometric Analysis of Bronze. Peter J. Gruszecki. *Foundry,* v. 78, Mar. 1950, p. 92-93, 146.
Developed to extend the range to very high percentages. Technique for determination of Pb, Sn, Zn and Ni in bronze alloys. (S10, Cu)

103-S. Life Tests of Tungsten and Tantalum Filaments in Ion Gauges. W. E. Bush. *U. S. Atomic Energy Commission,* AECD-2682, Jan. 8, 1944, 15 pages.
Relative life of filaments operated at low emission (low temperatures) compared to those operated at high emission; dependence of life upon the initial diameter; effect of varying concentrations of water vapor and air upon life; and life characteristics of Ta as compared to W.
(S21, T1, W, Ta)

104-S. Analytical Chemistry. 1. Introduction. H. Irving. **2. Analytical Emission Spectrography.** H. R. Clayton. **3. Flame Photometry.** L. Leyton. **4. Volumetric Analysis.** H. Irving. *Annual Reports on the Progress of Chemistry,* v. 45, 1948, p. 316-330.
Reviews recent progress in the above fields. 199 ref. (S11)

105-S. Repeatability of Test Results. E. D. van Rest. *Nature,* v. 165, Feb. 11, 1950, p. 230-231.
Discussion at a recent meeting of the London Group of the Royal Statistical Society's Industrial Applications Section. (S12)

106-S. Interferometric Study of Metal Surfaces; Application of the Multiple-Beam Technique. S. Tolansky. *Metal Treatment and Drop Forging,* v. 16, Winter 1949-50, p. 195-203.
Technique and typical results.
(S15)

107-S. Cast Iron From the Point of View of the Purchaser. W. P. Smith. *Foundry Trade Journal,* v. 88, Feb. 9, 1950, p. 139-144; discussion, p. 144-146.
Procedures for testing purchased castings, both by nondestructive and

destructive methods. Examples are quoted and related to foundry processes. (S general, CI)

108-S. The Use of Multi-Jet Electrodes in Polarographic Analysis. (In English.) S. T. Payne. *Analytica Chimica Acta,* v. 3, Dec. 1949, p. 686-692.

Principles of polarography. Simultaneous use of a number of dropping electrodes immersed in the same solution increases the sensitivity of the normal methods and minimizes oscillations in current value caused by formation and release of the mercury drops. (S11)

109-S. Radioactive Indicators in Metallurgy. (In French.) M. Haissinsky. *Métaux & Corrosion,* v. 24, Dec. 1949, p. 275-279.

Applications to solid-state reactions, i.e., diffusion in metals. 45 ref. (S19, N1)

110-S. Detection of Cracks by "Sweating". (In French.) H. de Leiris. *Revue de Métallurgie,* v. 46, Dec. 1949, p. 797-802.

Several methods, including the "Zyglo" fluorescent-liquid method and one using a highly colored liquid. The latter is recommended. (S13)

111-S. Instantaneous Spectrography. (In French.) J. Orsag. *Revue de Métallurgie,* v. 46, Dec. 1949, p. 803-805; discussion, p. 805-806.

A newly developed spectrograph directly connected with a photoelectric cell, for instantaneous quantitative indication and recording. (S11)

112-S. Research on Measurements of the Temperature of Molten Steel by Means of a Platinum/Platinum-Rhodium Thermocouple. (In French.) P. Bastien and J. Bleton. *Revue de Métallurgie,* v. 46, Dec. 1949, p. 807-817.

Methods and apparatus. Comparison of thermocouple and pyrometer data indicate that more accurate results are obtained when the former is used. Importance of temperature control of the molten steel. 11 ref. (S16, Fe)

113-S. Process for Determining the Melting Temperature in the Basic Bessemer Converter. (In German.) Gerhard Naeser and Werner Pepperhoff. *Stahl und Eisen,* v. 70, Jan. 5, 1950, p. 22-24.

Value of close control. Apparatus and procedure for measuring radiation at the blast tuyere by two photo-electric cells of different sensitivity. Temperature is computed electrically and recorded. (S16, D3, ST)

114-S. Concerning Resistance to Precipitation in Electro-Analytical Determinations. (In German.) Alwin Schleicher and Otmar Schlösser. *Fresenius' Zeitschrift für analytische Chemie,* v. 130, no. 1, 1949, p. 1-16.

A series of experiments shows that reactions occurring at the cathode can be used to evaluate results of precipitation methods. The method described permits calculation of variations of energy, output, and resistance, giving insight into forces which oppose the complete, rapid, and adherent deposition of the metals. (S11)

115-S. Qualitative Analysis of Nonferrous Alloys Using the "Steeloscope" With a Photometric Ocular. (In Russian.) M. M. Averbukh and I. I. Erina. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Dec. 1949, p. 1431-1434.

Attachment for spectrographic analysis which allows qualitative analysis to be completed in 2-3 min. (S11, EG-a)

116-S. Determination of Small Amounts of Calcium in Steel by Spectrographic Analysis. (In Russian.) A. G. Komarovskii. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Dec. 1949, p. 1435-1437.

Method, calibration curves and typical data. (S11, ST, Ca)

117-S. Spectrographic Determination of Large Concentrations of Antimony in Lead. (In Russian.) A. I. Alekseeva and L. E. Naimark. *Zavodskaya Laboratoriya* (Factory Laboratory), v. 15, Dec. 1949, p. 1437-1439.

Approximate method for 2-10% Sb. (S11, Pb, Sb)

118-S. The Determination of Oxide Lead in Ores and Concentrator Products. R. S. Young, A. Golledge, and H. L. Talbot. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 204-207.

Previously abstracted from *Mining Technology.* See item 10c-32, 1948. (S11, Pb)

119-S. A Suggested Approach to the Analysis of Mineral Suspensions by High-Frequency Electrical Measurements. John D. Morgan, Jr., and Sylvain J. Pirson. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Minerals Beneficiation Div.), v. 183, 1949, p. 276-282. (S11)

120-S. Quantitative Spectrographic Determination of Minor Elements in Zinc Sulphide Ores. L. W. Strock. *Transactions of the American Institute*

of Mining and Metallurgical Engineers (Extractive Metallurgy Division), v. 182, 1949, p. 226-247.

Previously abstracted from *Metals Technology*. See item 10-31, 1945. (S11, Zn)

121-S. Spectrographic Analysis of Special High-Grade Zinc. A. Y. Bethune and W. W. Schmittroth. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Extractive Metallurgy Division), v. 182, 1949, p. 248-260.

Previously abstracted from *Metals Technology*. See item 10-117, 1946. (S11, Zn)

122-S. The Determination of Oxide Cobalt. R. S. Young, A. J. Hall, and H. L. Talbot. *Transactions of the American Institute of Mining and Metallurgical Engineers* (Extractive Metallurgy Division), v. 182, 1949, p. 261-265.

Previously abstracted from *Metals Technology*. See item 10-114, 1946. (S11, Co)

123-S. Graphic Inspection Method Pin-Points Errors in Machined Parts. Fred Bohle. *Steel*, v. 126, Mar. 20, 1950, p. 85-86, 88.

Automatic recording of inspection-instrument readings which is proving valuable in checking gears and other parts with complex surfaces. (S14, T7)

124-S. Quality Control Indicator Developed by General Electric. *Better Enameling*, v. 21, Mar. 1950, p. 16, 31.

Electric calculating machine that keeps a continuous check on reject rates in production operations. (S18)

125-S. Quality Control Indicator Helps Keep Rejections at Low Levels. *Machinery* (American), v. 56, Mar. 1950, p. 155-156.

New electrical instrument developed by General Electric. (S18)

126-S. The Immersion Thermocouple. *Journal of Metals*, v. 188, Mar. 1950, p. 468B-470.

Three users report on steel bath temperature control. Procedure, advantages, and cost. (S16, ST)

127-S. Electronic Inspection Machines Accurately Sort Products for Size. Alexander Maxwell. *Machine Design*, v. 22, Mar. 1950, p. 140-142.

Equipment applied to small parts. (S14)

128-S. High-Speed Blade-Checking. *Aircraft Production*, v. 12, Mar. 1950, p. 73-75.

Application of British multidimensional checking machine to gas-turbine blades. (S14)

129-S. Inspection of Sheet and Strip. J. E. Jenkins. *Light Metals*, v. 13, Feb. 1950, p. 98-105; Mar. 1950, p. 140-145.

Practical methods for inspecting of light-alloy sheet and strip. Feb. issue: Personnel, principles, and procedure. Mar. issue: Common defects in rolled sheet and strip; methods for recovery of material from rejects. (S13, A8, Al, Mg)

130-S. Cutting Costs by Standardizing Tool Materials. E. Griffiths. *Iron Age*, v. 165, Mar. 30, 1950, p. 94-97.

Westinghouse program of tool-material control and standardization embraces purchasing and inventories, furnace strain relief, machining, and other factors bearing on choice and use of tool and die steels. (S22, TS)

131-S. The Analytical Quantometer: It's Lightning Fast and Highly Accurate. F. L. Church. *Modern Metals*, v. 6, Mar. 1950, p. 23-24.

Automatic spectrographic equipment used by Apex Smelting Co. for precise control of compositions in Al scrap-melting operations. (S11, Al)

132-S. Conductometric Method for the Determination of Carbon in Steel. E. L. Bennet, J. H. Harley, and R. M. Fowler. *Analytical Chemistry*, v. 22, Mar. 1950, p. 445-448.

Apparatus for determining small amounts of carbon in steels by measuring change in conductivity of a $Ba(OH)_2$ solution. Results compare favorably with those obtained by use of combustion and gas-fractionating apparatus. (S11, ST)

133-S. Determination of Carbon in Ferrous Alloys. Robert M. Fowler, W. G. Guldner, T. C. Bryson, John L. Hague, and H. J. Schmitt. *Analytical Chemistry*, v. 22, Mar. 1950, p. 486-488.

Summarizes round-table discussion. Each speaker discussed the apparatus used in his laboratory for alloys containing less than 0.10% C. (S11, Fe)

134-S. The Inspection and Testing of Engineering Materials. R. O. Wates. *Science & Engineering*, v. 2, Dec. 1949, p. 213-217. Reprinted from *Engineering Inspection*, v. 13, no. 1, 1949.

Organization and operation of a department concerned with the testing and inspection of metallic materials. (S general)

135-S. Development, Significance and Uses of Specifications for Cast Iron. H. Bornstein. *Foundry*, v. 78, Apr. 1950, p. 78, 222, 224-227. (S22, CI)

136-S. A Quick Test for Carbon in Steel. Yun-Luan Sun. *Foundry*, v. 78,

Apr. 1950, p. 86-87, 220.
Procedure for determining carbon using a Rockwell hardness test on a quenched specimen. (S11, ST)

137-S. Advances in Inspection. Dorian Shainin. *Tool Engineer,* v. 24, Mar. 1950, p. 17-21.
Recent developments in fixed type gaging. Increased applications of the principles of optics, electronics, and airflow. (S14)

138-S. Noncontacting Beta-Ray Thickness Gage. C. W. Clapp and S. Bernstein. *General Electric Review,* v. 53, Mar. 1950, p. 31-34; *Electrical Engineering,* v. 69, Apr. 1950, p. 308-310.
How beta rays, measured by an ionization chamber, give indication, record, or control of thickness of homogeneous materials of various textures and consistencies without physical contact. (S14)

139-S. Geiger-Muller Tubes in Industrial Radiography. O. J. Russell. *Electronic Engineering,* v. 22, Mar. 1950, p. 94-98.
(S13)

140-S. Effects of an Aging Treatment on Life of Small Cast Vitallium Gas-Turbine Blades. Charles A. Hoffman and Charles Yaker. *National Advisory Committee for Aeronautics,* Technical Note 2052, Mar. 1950, 33 pages.
Twenty blades aged for 48 hrs. at 1500° F. were compared with 33 unaged blades operated at a blade temperature of approximately 1500° F. and a stress of 20,000 psi. at the blade-failure plane.
(S21, J27, T25, Co, SG-h)

141-S. Inspection by Radon of Large High-Pressure Vessels. V. E. Pullin. *Engineer,* v. 189, Mar. 3, 1950, p. 262-263.
Probably the first example of the use of high concentrations of radon for routine examination of Grade I pressure vessel welding. (S13, T26)

142-S. Spectro-Analytical Investigation of Sand- and Chill-Cast Al-Si-Cu Alloys. (In German.) G. Müller-Uri. *Spectrochimica Acta,* v. 3, nos. 5-6, 1949, p. 560-568.
Development of a standard method for analysis of Al containing 5% Si, Mg, and Cu. Chill-cast rods 3 mm. in diam. are sparked with a Feussner type source. Wave lengths used for Mg, Si, Cu, Mn, Fe, Zn, Ti, and Ni are listed with other details of procedure. (S11, Al)

143-S. Spectro-Analytical Determination of Iron in Zinc Blende. (In German.) F. Rost. *Spectrochimica Acta,* v. 3, nos. 5-6, 1949, p. 569-574.
11 references. (S11, Fe, Zn)

144-S. Spectrographic Analysis of Slags Using Spark Technique. (In English.) J. Eeckhout. *Spectrochimica Acta,* v. 3, nos. 5-6, 1949, p. 575-583.
Quantitative method for the analysis of steel-furnace slags. A high-voltage condensed-spark excitation is used with powdered samples on a flat pure-graphite electrode. Calibration curves were prepared both for determination of percentage of different elements in the slags, using CuO as an internal standard, and for determination of oxide-silica ratios, using a mixture of sample with pure graphite. (S11, ST)

145-S. Experiences With Temperature Indicating Colors. (In German.) Kurt Güthmann. *Stahl und Eisen,* v. 70, Feb. 2, 1950, p. 116-118.
Method and results reported in foreign and domestic literature. 12 ref. (S16)

146-S. There's Profit in Automatic Gaging. A. Sanford. *Machinery* (American), v. 56, Apr. 1950, p. 146-151.
Progressive steps that can be employed to decrease inspection costs—from application of indicator gages to the use of complex machines that automatically position the parts, measure their size, and segregate them into various classifications. (S14)

147-S. Funetional Checking of Gear Teeth. Louis D. Martin. *Machinery* (American), v. 56, Apr. 1950, p. 208-213.
Equipment and procedures. A functional check is a means of inspection that duplicates, or comes close to duplicating, the final use of a product. (S14)

148-S. Blade Inspection. *Aircraft Production,* v. 12, Apr. 1950, p. 120-122.
Sigma electric transmitting gages used to give dimensional indications of profile variations in turbine blades. (S14)

149-S. Quality Control at Sunnyvale. *Western Machinery and Steel World,* v. 41, Mar. 1950, p. 74-77.
Equipment at Sunnyvale, Calif., shop of Westinghouse Electric Corp. (S12)

150-S. Measurement of Open Hearth Bath Temperatures. *Industrial Heating,* v. 17, Mar. 1950, p. 458, 460, 462, 464. Condensed from paper by H. T. Clark.
Recent developments.
(S16, D2, ST)

151-S. Metal Decorating Ovens Require Precise Temperature Control. *Industrial Heating,* v. 17, Mar. 1950, p. 481-482, 484, 486, 488.
Controls used with continuous-feed ovens. (S16, L26)

152-S. Steel Compositions and Specifications From the Steel Producers Viewpoint. Charles M. Parker. *Blast Furnace and Steel Plant,* v. 38, Apr. 1950, p. 438-443, 468. A condensation.

Previously abstracted from another version in *SAE Journal.* See item 12B-74, 1949. (S22, ST)

153-S. An X-Ray Method for Determining Tin Coating Thickness on Steel. H. F. Beeghly. *Journal of the Electrochemical Society,* v. 97, Apr. 1950, p. 152-157.

Results were obtained comparable in accuracy and reproducibility to those obtained with usual chemical methods. The principle is applicable to other coatings and to continuous indication and control of tin-coating weights on the electrotinning line. Such a unit has been designed and built. (S14, L17, Sn, ST)

154-S. The Trace Analysis of Silicon in Vanadium and Uranium; A Spectrophotometric Method. Ruth Guenther and Richard H. Gale. *U. S. Atomic Energy Commission,* AECD-2792, Nov. 8, 1949, 9 pages.

Metal is removed by $CHCl_3$ extraction of its cupferrate, silicomolybdate color developed, and transmittancy determined at 390 mμ. System shows adherence to Beer's Law from 0.02-0.28 mg. Si per 100 ml. with a reproducibility of $\pm$0.004 mg. Si per 100 ml. (S11, V, U)

155-S. The Use of a Polarizer in the Disappearing Filament Optical Pyrometer. R. G. Giovanelli and W. R. G. Kemp. *Journal of Scientific Instruments,* v. 27, Mar. 1950, p. 69-71.

Polarizer was found to give complete disappearance of straight flat pyrometer filaments for apertures considerably larger than permissible in conventional pyrometers. Larger apertures result in higher visual resolution, and greater precision may be obtained in temperature measurements. (S16)

156-S. Speed and Contrast in Radiography. H. S. Tasker. *Photographic Journal,* v. 90B, Jan.-Feb. 1950, p. 9-21.

The density differences produced in a radiograph by a difference of section thickness depend on degree of absorption of the radiation, contrast of the film at the density level employed, and magnitude of the difference of section. Since absorption of radiation varies with kilovoltage, and film contrast with photographic density, there is a reciprocal relation between kilovoltage and density of the radiograph. The form of this relation and its effect on exposure time was examined for several different X-ray films of aluminum and mild steel. (S13)

157-S. Automatic Control of Industrial Furnaces. Leo Walter. *Engineer,* v. 189, Mar. 3, 1950, p. 260-262; Mar. 10, 1950, p. 292-294; Mar. 17, 1950, p. 324-325; Mar. 24, 1950, p. 351-352.

Various systems are clarified by schematic diagrams. (S16)

158-S. Automotive Cast Iron, Including Brake Drums. R. A. McElwee. *Foundry Trade Journal,* v. 88, Mar. 16, 1950, p. 281-283.

Specifications, foundry practice, and routine tests.
(S22, E general, T21, CI)

159-S. Hydrogen in Aluminium; Method of Determination—Effect on Pore Formation. Y. Dardel. *Metal Industry,* v. 76, Mar. 17, 1950, p. 203-206.

Effect of pore formation during solidification, heat treatment, and welding, together with a method for determination of hydrogen content. 21 ref. (S11, N12, Al)

160-S. Surface Thermometer. (In French.) M. E. Brun. *Journal des Recherches du Centre National de la Recherche Scientifique,* no. 10, 1950, p. 21-22.

A newly developed instrument for temperatures of -150 to 600° C., characterized by small size and high sensitivity. (S16)

161-S. Ultrasonic Testing of Gas Turbine Disks. *Metal Progress,* v. 57, Apr. 1950, p. 468-473.

To correlate indications derived from ultrasonic testing, 22 complete forgings were sectioned and discontinuities or coarse crystalline regions revealed. Analysis of inspection reports on 839 such forgings of high-alloy (16-25-6 Cr-Ni-Mo) for jet-engine disks shows that minor indications found in the intermediate stage of forgings are not necessarily a cause for rejection. However, 3.5% of the sound upset blocks developed rejectable defects during the finishing stages of forging. Of the 839 original blocks, 772 finished forgings were accepted.
(S13, T25, F22, SS, SG-h)

162-S. Sonic Tests Spot Flaws in Heavy Forgings. Robert W. Snowden. *Iron Age,* v. 165, Apr. 13, 1950, p. 77-81.

Pictorial study, including Oscilloscope photos of all types of common defects. (S13, CN)

163-S. New Control System Improves Pipe Quality. D. A. Evans. *Iron Age,* v. 165, Apr. 13, 1950, p. 82-85.

Multiple-correlation method using routine tests which analyzes effects of materials and methods on pipe production. Three variables—carbon,

manganese, and wall thickness—give a quick statistical check on quality of steel pipe. (S12, CN)

164-S. What Radioisotopes Can Mean to Industry. Charles Rosenblum. *Nucleonics,* v. 6, Apr. 1950, p. 25-36.

Applications to problems in petroleum chemistry, metallurgy, polymerization, lubrication, corrosion, electrochemistry, agriculture, animal husbandry, and food processing. Analytical radiometric analysis is outlined. 53 ref. (S19, S11)

165-S. Neutron Spectroscopy for Chemical Analysis. III. Thermal Neutrons, Neutron Flux, Activation. T. I. Taylor and W. W. Havens, Jr. *Nucleonics,* v. 6, Apr. 1950, p. 54-66.

Analytical application of thermal neutrons. Methods of analysis involving transmission measurements, neutron-flux reduction by an absorber, and radioactivation by neutrons. 24 ref. (S11)

166-S. Air Gages Aid Quality Production. H. E. Linsley. *American Machinist,* v. 94, Apr. 17, 1950, p. 73-77.

Machining operations, precision gaging, assembly and testing of refrigeration compressors. (S14, G17)

167-S. Niessner's Rapid-Testing Process for Identifying Alloys. (In German.) F. Lilh. *Werkstoffe und Korrosion,* v. 1, Feb. 1950, p. 70-74.

Proposed patented method is an electrochemical process in which the e.m.f. generated by the alloy to be tested and that of a standard electrode metal in a suitable electrolyte are compared. (S10)

168-S. Report on the Progress of Analytical Chemistry. (In German.) *Fresenius' Zeitschrift für analytische Chemie,* v. 130, nos. 2-3, 1950, p. 235-299.

A classified review of recent literature, with different sections by different authors. (S11)

169-S. Measurement of Waviness of Finished Surfaces. (In Russian.) P. E. D'yachenko and V. Z. Vainshtein. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Jan. 1950, p. 15-16.

Defines waviness as regular, repetitive irregularity of the surface caused by nonuniformity of the cutting process. Special modifications of ordinary profilometers to measure waviness of surfaces. (S15)

170-S. (Book) **A.S.T.M. Standards on Copper and Copper Alloys. Rev. Ed.** 496 pages. 1949. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

Cu, Cu alloys, cast and wrought electrical conductors, and nonferrous metals used in Cu alloys. (S22, Cu)

171-S. (Book) **Laboratory and Workshop Notes.** Ruth Lang, Editor. 273 pages. 1949. Edward Arnold & Co., London.

Selected and reprinted from *Journal of Scientific Instruments.* Includes sections on joining, glass manipulation, vacuum, pressure, electrical, magnetic, optical, technique and apparatus, etc.
(S general, P general)

172-S. (Book) **L & N Bibliography of Polarographic Literature.** 102 pages. 1950. Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia 44, Pa.

Presents 2201 references listed according to date of publication (1903-1949). Includes author and subject indexes. (S11)

173-S. (Book) **Précis d'Analyse Chimie des Aciers et des Fontes.** (Chemical Analysis of Steels and Cast Irons.) M. Jean. 542 pages. 1949. Dunod, 92 rue Bonaparte, Paris 6, France. 3360 fr.

Details of modern methods, particularly from the point of view of production control. Scientific principles are also included. Includes bibliography. ((S11, ST, CI)

174-S. Radon—Its Place in Non-Destructive Testing. V. E. Pullin. *Welding,* v. 18, Apr. 1950, p. 166-169.

Procedures and equipment. (S13)

175-S. Gamma Radiography. *Atomics,* v. 1, Apr. 1950, p. 108-112.

An illustrated survey of procedures and applications to nondestructive inspection of metallic parts. (S13)

176-S. How To Control Powder Part Size. E. E. Ensign and I. A. DeGrote. *Iron Age,* v. 165, Apr. 20, 1950, p. 83-86.

Mass production of a powdered-metal distributor bushing at Ford Motor Co. demanded precise control of tolerances. Rejections were cut about 90% after statistical quality control was put in operation. Clarified by graphs. (S12, H general)

177-S. How GE Buys Powder Parts. J. D. Carey and A. G. Pison. *Iron Age,* v. 165, Apr. 20, 1950, p. 95-97.

Special test procedures used to maintain quality in powdered-metal parts purchased from vendors. Accelerated and statistical quality-control tests are applied.
(S2, H general)

178-S. New Tinplate Coating Thickness Meter. *Iron Age,* v. 165, Apr. 20, 1950, p. 99.

Meter which continuously indicates

and records tin-coating thickness on steel strip during electroplating. (S14, L17, Sn, ST)

179-S. Rapid Photometric Determination of Iron in High Temperature Alloys. Michael Stevens Pepi. *Analytical Chemistry,* v. 22, Apr. 1950, p. 560-561.

Method is based on reaction of ferrous ion with 1,10-phenanthroline. Reproducibility is good and average error is ±0.02% of the amount present. (S11, Fe, SG-h)

180-S. Magnetic Particle Inspection in the Oil Industry. George L. C. Dehn. *Drilling Contractor,* v. 6, Apr. 15, 1950, p. 65-68.

Miscellaneous applications to equipment. (S13, T28)

181-S. A Proportional Reset Furnace Controller for Temperatures up to 1600° C. R. W. Nurse and J. H. Welch. *Journal of Scientific Instruments,* v. 27, Apr. 1950, p. 97-99.

Controller which will regulate temperature within ±¼° C. (S16)

182-S. Sonic Tests Spot Flaws in Heavy Forgings. Robert W. Snowdon. *Iron Age,* v. 165, Apr. 27, 1950, p. 88-90.

Second and concluding installment describes sonic testing of irregular shapes, which requires special techniques and equipment. Procedures for eccentric cranks and drill collars (Concluded.) (S13, CN)

183-S. Quality Control Lowers Costs; Boosts Production. Nelson G. Meagley. *Iron Age,* v. 165, Apr. 27, 1950, p. 91-94.

Details of chart methods used by Willys-Overland Motors, Toledo, Ohio. (S12)

184-S. Inspection and Classification of Metals Made Easy. B. M. Smith. *Iron Age,* v. 165, Apr. 27, 1950, p. 95-98.

How use of the GE metals comparator has been broadened through development of a new test head. Large parts may be inspected nondestructively, and mixed lots of metals separated. The device is used for close control of composition, heat treatment, hardness, case depth, and plating thickness. (S10, S14, J28, L17)

185-S. Tentative Specifications for Automotive Gray Iron Castings: ASTM Designation: A 159—49T. *Foundry,* v. 78, May 1950, p. 177-178. (S22, CI)

186-S. Determination of Free Cyanide and Ammonia in Brass and Bronze Plating Baths. Part I. Theory and Literature Review of Free Cyanide Determination. Samuel Heiman. *Plating,* v. 37, May 1950, p. 476-481. 43 references. (S11, L17, Cu)

187-S. Determination of Impurities in Electroplating Solutions. XIX. Traces of Nickel in Copper Plating Baths. Earl J. Serfass, W. S. Levine, P. J. Prang, Mary H. Perry, and R. B. Freeman. *Plating,* v. 37, May 1950, p. 495-499.

Reviews literature and describes colorimetric method developed. 23 ref. (S11, L17, Ni, Cu)

188-S. Growing Number of Metal Drums Makes Knowing "Specs" a Shipper's "Must". T. Pat Callahan. *Chemical Industries,* v. 66, Apr. 1950, p. 582, 584.

Specifications for alloy types and designs required for shipment and storage of various industrial chemicals. (S22, T29, SG-g)

189-S. Temperatures of Liquid Iron and Steel in Practice. T. B. Winkler. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 11-23.

Previously abstracted under similar title from *Blast Furnace and Steel Plant.* See item 13-39, 1949. (S16, D2, ST)

190-S. A Bath-Temperature Pyrometer. J. A. Warchol. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 32, 1949, p. 162-167; discussion, p. 167.

Experiments with the Leeds and Northrup immersion pyrometer which employs the radiation principle and is used in determining temperature of molten steel. (S16, ST)

191-S. Reduction of Zirconium and Thorium by Means of the Dropping Mercury Cathode. (In Italian.) Danilo Cozzi. *Proceedings of the XIth International Congress of Pure and Applied Chemistry* (July 1947), v. 1, p. 57-68.

A polarographic study of reduction of $ZrOCl_2$ and $ThCl_4$ in KCl solution. Reduction is performed in the presence of methylene blue. (S11, Zr, Th)

192-S. From a Metallurgist's Notebook: Propeller Bronzes. H. H. Symonds. *Metal Industry,* v. 76, Apr. 14, 1950, p. 289-290.

Concerned with the failure of ships' propellers. Examination of the samples submitted showed that, because the cooling rate was too high, thus suppressing alpha separation, the structure was wholly beta and therefore inclined to be brittle. (S21, N9, Q general, Cu)

193-S. Spectrochemical Analysis of Steels, Cast Irons, and Zinc. (In French.) A. Hannick and A. Hans. *Revue de Metallurgie,* v. 47, Feb. 1950, p. 134-138.

Precision, rapidity, and sensitivity of this method for determination of residual and added elements in concentrations between 0.0006 and 5.0%. (S11, ST, CI, Zn)

194-S. Method of Quantitative X-Ray Analysis of Allotropic Modifications of Cobalt. (In French.) M. Sage and Ch. Guillaud. *Revue de Métallurgie,* v. 47, Feb. 1950, p. 139-144; discussion, p. 144-145.

Theory and practical application. (S11, Co)

195-S. A New Wall-Thickness Meter for Ferromagnetic Materials. (In German.) Rudolf Berthold. *Stahl und Eisen,* v. 70, Mar. 16, 1950, p. 233-234.

Calibration curves and typical data. (S14)

196-S. Automatic Photoelectric Pyrometer. (In Russian.) E. G. Ruttera, N. P. Chizhova, V. A. Savel'eva, L. V. Kuznetsova, and V. L. Aizenshtoka. *Promyshlennaya Energetika* (Industrial Power), v. 7, Jan. 1950, p. 13-14.

Circuit diagram of pyrometer developed especially for use during cooling of high speed steel. (S16, TS)

197-S. Faster Inspection of Connecting Rods. C. J. Moody. *Automotive Industries,* v. 102, May 1, 1950, p. 33, 82.

Former practice for Ford connecting-rod forgings involved pickling to remove scale and rust prior to individual-piece inspection for defects such as forging laps, heat treat cracks, etc. Present procedure consists of shot blasting followed by automatic fluorescent magnetic-particle inspection. Besides releasing at least five men, endurance limit is increased by the shot blasting. (S13, T21, ST)

198-S. Quick Inspection Method for Engine Parts. Rebecca H. Smith. *Automotive Industries,* v. 102, May 1, 1950, p. 46-47, 90.

Dye Penetrant Method (DPM) developed at Turbodyne Corp., for inspection of gas-turbine parts in a variety of ferrous and nonferrous alloys. (S13, T25)

199-S. Warpage and Cross-Bending Tests as Criteria of Resistance of Enamels Under Stress in Service. D. R. Goetchius and E. E. Bryant. *Journal of the American Ceramic Society,* v. 33, May 1, 1950, p. 149-151.

Various commercial finish-coat enamels of widely different compositions were evaluated using the above test. Values obtained were compared with known service data. Working ranges of these values that meet specific requirements are indicated. (S21, L27)

200-S. Oil Powder Method of Flaw Detection. *Industry & Welding,* v. 23, May 1950, p. 27, 76-77.

New method developed by the Navy. (S13)

201-S. INCO Writes Specs for Ductile Iron. A. P. Gagnebin. *Iron Age,* v. 165, May 4, 1950, p. 89.

To date, no standard specifications have been established as a basis for purchase. International Nickel Co. suggests a set based on physical properties desired in various applications. (S22, CI)

202-S. The Use of Briquetted Samples in the Spectrochemical Analysis of Carbon and Alloy Steels and Other Metals. J. F. Woodruff. *Journal of the Optical Society of America,* v. 40, Apr. 1950, p, 192-196.

Briquetted-sample techniques for routine analysis of steel, zinc, and Zn-base alloys. Low and plain carbon steels are analyzed quantitatively for such elements as Sn, Pb, Mn, Ni, Cr, Mo, Co, Ti, Al, Zn, and B. Zn and Zn-base alloys are analyzed quantitatively for Cd, Fe, Pb, Sn, Sb, and Al. Operational details and precision and accuracy over a five-year period. 13 ref. (S11, CN, AY, Zn)

203-S. The Theory of Sampling Inspection Plans. H. C. Hamaker. *Philips Technical Review,* v. 11, Mar. 1950, p. 260-270.

Systematic analysis of different sampling-inspection systems. (S12)

204-S. Statistical Methods for Evaluating the Quality of Certain Wrought Steel Products. Edwin G. Olds and Cyril Wells. *Transactions of American Society for Metals,* v. 42, 1950, p. 845-890; discussion, p. 891-899.

Previously abstracted from Preprint. See item 12-186, 1949. (S12, ST)

205-S. Determination of Oxygen in Metals by the Vacuum-Fusion Method. R. K. McGeary, J. K. Stanley and T. D. Yensen. *Transactions of American Society for Metals,* v. 42, 1950, p. 900-913; discussion, p. 913-916.

Previously abstracted from Preprint. See item 10A-130, 1949. (S11)

206-S. The Tungsten-Iridium Thermocouple for Very High Temperatures. Walter C. Troy and Gary Steven. *Transactions of American Society for Metals,* v. 42, 1950, p. 1131-1149; discussion, p. 1150-1160.

Previously abstracted from Preprint. See item 13-58, 1949. (S16)

207-S. The Use of the Spectroscope in the Steel Industry. E. O. Waltz. *American Iron and Steel Institute Yearbook,* Preprint, 1950, 10 pages.

Methods used on production samples. Man-hour reduction, more heats per day, time saved on open-hearth, and limited use for some other elements. (S11, ST)

208-S. Metal Composition Tests for the Steel Melter. H. H. Fairfield, H. F. Graham and A. E. McMeekin. *American Foundrymen's Society,* Preprint No. 50-30, 1950, 6 pages.

Tests using hardenability properties for estimating the composition of carbon steels in less than 2 min. (S11, CN)

209-S. A Simple Instrument for Measuring "Surface Truth" of Metal Surfaces and the Amount of Polishing Required. G. E. Gardam. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950. (Advance Copy No. 4, 8 pages.)

(S15, L10)

210-S. Measurements and Measuring Methods for Quantity Inspection of Small Size Precision. Alwin Meier. *Microtechnic,* v. 4, Jan.-Feb. 1950, p. 13-27. Translated from the French.

Methods used in production of watch parts. (S14)

211-S. Notes on the Spectrophotometric Determination of Copper as Diethyldithiocarbamate. (In English.) T. C. J. Ovenston and C. A. Parker, *Analytica Chimica Acta,* v. 4, Apr. 1950, p. 135-141.

14 references. (S11, Cu)

212-S. Notes on the Spectrophotometric Determination of Cobalt and Nickel in the Microgram Range. (In English.) T. C. J. Ovenston and C. A. Parker. *Analytica Chimica Acta,* v. 4, Apr. 1950, p. 142-152.

10 references. (S11, Co, Ni)

213-S. Polarographic Determination of the Impurities Fe, Cu, Cd, Zn, Sb, and Zn in Refined Lead. (In German.) D. Cozzi. *Analytica Chimica Acta,* v. 4, Apr. 1950, p. 204-210.

(S11, Pb)

214-S. Critical Cold Working Properties of Cr-Mo-Si Superheater-Tube Steels. (In German.) W. Mielentz. *Brennstoff-Warme-Kraft,* v. 2, Jan. 1950, p. 9-13.

Fundamental study of service failures. Low-alloy steels or those with radial structures were not appreciably susceptible to such failures, in contrast with steels having clearcut granular structures. (S21, T25, AY)

215-S. Concerning Causes of Failure of Bucket Cranes of 5000 Kg. Lifting Capacity. (In Russian.) M. M. Kobrin. *Vestnik Mashinostroeniya* (Bulletin of the Machine Construction Industry), v. 30, Jan. 1950, p. 23-25.

Includes micrographs, macrographs, mechanical properties, and chemical compositions of the failed metal. (S21, T5, CN)

216-S. Radioisotopes Serve Metallurgy. *SAE Journal,* v. 58, May 1950, p. 43-45. Based on "Radioactive Tracers for Detection of Submicroscopic Quantities of Material Transfer", by R. A. James; "Industrial Application of Radioisotopes", by William Reid; and "Radioisotopes", by Keith Symon. (S19)

217-S. Radiation Pyrometer for Lower Temperatures. Sam Tour. *Iron Age,* v. 165, May 18 1950, p. 90-93.

Equipment by which tinplate temperatures between 180 and 400° F. can be measured. Accurate measurements can be taken as close as 18 in. from the heated strip. Development required investigations of radiation theory and studies of the limitations of previous instruments. (S16)

218-S. Determination of Impurities in Inert Gases. R. E. Bowman and C. B. Hartley. *Welding Journal,* v. 29, May 1950, p. 258s-262s.

Equipment and techniques for determining impurities in A and He, used in arc welding. The method is based on the fact that molten Li absorbs N_2, O_2, and water vapor. (S11, K1)

219-S. From a Metallurgist's Notebook: Defective Safety Pins. H. H. Symonds. *Metal Industry,* v. 76, Apr. 28, 1950, p. 327-328.

Investigation of failures in the caps of Ni-plated brass safety pins. Microstructural examination indicated that stress-corrosion cracking was the primary cause of failure. Plating conditions were contributory causes. (S21, R1, L17, Cu, Ni)

220-S. Hot-Extraction Method of Gas Analysis as Applied to Cast Iron. J. E. Hurst and R. V. Riley. *Proceedings of the Institute of British Foundrymen,* v. 42, 1949, p. A185-A188; discussion, p. A189-A191.

Previously abstracted from "Gases in Cast Iron", *Foundry Trade Journal.* See item 10B-81, 1949. (S11, CI)

221-S. (Book) **An Index of Nomograms.** Douglas P. Adams, compiler. 174 pages. 1950. Technology Press, Massachusetts Institute of Technology, Cambridge, Mass.; and John Wiley & Sons, 440 Fourth Ave., New York 16, $4.00.

Lists references to 1700 published nomograms by subject. Covers all major fields of science and technology from mathematics and physics; welding, metals, and machine design; to medicine and food. Indicates variables employed in each. (S22)

222-S. Standardization of Toolsteels in Sweden, *Metal Progress,* v. 57, May 1950, p. 643, 678. Translated and condensed from *Verkstäderna* (Sweden), v. 44, 1948, p. 166+.

Includes tabulation of compositions of 18 standard types, showing Brinell hardness and ASM Handbook type for each. (S22, TS)

223-S. How To Specify Copper Alloys. *Steel,* v. 126, May 22, 1950, p. 84.

Based on pamphlet by James T. Duffy, Jr., published by Riverside Metal Co. (S22, Cu)

224-S. Better Weldments Through "Tailored" Quality Control. Orville T. Barnett. *Steel,* v. 126, May 22, 1950, p. 80-82.

Essential features, including design, procedure, operator training, inspection, testing, and microscopic examination. A few typical examples. (S12, K general)

225-S. Why Machine Parts Fail. Part 1. Fracture and Inherent Strength. Charles Lipson. *Machine Design,* v. 22, May 1950, p. 95-100.

First of a series of articles based on studies of service failures extending over several years. Recognition, classification, and analysis of metal fractures. 10 ref. (S21, Q26)

226-S. Impeller Inspection. *Aircraft Production,* v. 12, May 1950, p. 145-147.

Solex installation for production checking of gas-turbine blade thickness and profiles. In this system a number of pneumatically operated styluses are used to compare the profile of the blade with that of a master, at predetermined coordinates. Results are shown on a series of dials, each corresponding to one stylus-point. (S15)

227-S. Simultaneous Spectrophotometric Determination of Cobalt, Copper, and Iron. R. E. Kitson. *Analytical Chemistry,* v. 22, May 1950, p. 664-667.

16 references. (S11, Co, Cu, Fe)

228-S. Some Aspects of Automatic Control of Heat-Treatment Furnaces. A. Linford. *Metal Treatment and Drop Forging,* v. 17, Spring 1950, p. 53-60, 62.

Application of basic principles in various types of commercial equipment. (S16, J general)

229-S. Temperature Measurement Without Time-Lag for Rapidly Moving Objects, Especially as Applied to Flame Hardening. (In German.) W. Hunsinger and H. W. Grönegress. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, Apr. 21, 1950, p. 285-290.

A new incandescent-filament pyrometer which instantaneously indicates when any desired temperature has been reached. A number of uses of this instrument are briefly discussed. (S16, J2)

230-S. An Electronic Tramp Iron Detector for Ore Conveyor Belts. C. M. Marquardt. *Mining Engineering,* v. 187, June 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, 1950, p. 703-705; discussion, p. 706.

Tramp iron and steel moving on a conveyor belt cause small currents to be generated in a coil situated in a strong magnetic field, which are converted to an alternating current and are amplified. Output voltage from the amplifier fires a thyratron with a relay in its anode circuit, which actuates a howler and simultaneously drops a spot of marker material on the belt. (S10, B general, Fe)

231-S. A Thickness Gauge for Ceramic Coatings. C. C. Gordon and J. C. Richmond. *Finish,* v. 7, June 1950, p. 35, 61.

Electromagnetic method of measuring thickness of coatings (paint, plastic, ceramic, and other nonconducting films) applied on nonmagnetic metal bases. (S14)

232-S. Spectrographic Determination of Magnesium in Nodular Iron. Ford R. Bryan, G. A. Nahstoll, and H. D. Veldhuis. *Foundry,* v. 78, June 1950, p. 102-103, 244-248; discussion, p. 248-249.

Previously abstracted from *ASTM Bulletin.* See item 2-S, 1950. (S11, Mg, CI)

233-S. High Strength Steel Bolts. C. L. Harvey. *Fasteners,* v. 6, no. 3 (1950), p. 10-12.

New ASTM standard. Table gives mechanical properties of different sizes. (S22, T7, ST)

234-S. Report of Committee A-1 on Steel. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 84-89 Previously abstracted from *American Society for Testing Materials,* Preprint No. 1. See item 12-129, 1949. (S22, ST)

235-S. Report of Committee A-10 on Iron-Chromium, Iron-Chromium-Nickel, and Related Alloys. *American So-*

ciety for Testing Materials, Proceedings, v. 49, 1949, p. 133-140.

Previously abstracted from *American Society for Testing Materials,* Preprint No. 7. See item 6B-103, 1949. (S22, R3, AY, SS)

236-S. Report of Committee B-4 on Electrical Heating, Resistance and Related Alloys. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 171-173.

Previously abstracted from *American Society for Testing Materials,* Preprint No. 11. See item 12-130, 1949. (S22, SG-q)

237-S. Report of Committee B-5 on Copper and Copper Alloys, Cast and Wrought. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 174-202.

Previously abstracted from *American Society for Testing Materials,* Preprint No. 12. See item 12-131, 1949. (S22, Q27, Cu)

238-S. Report of Committee B-7 on Light Metals and Alloys, Cast and Wrought. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 205-214.

Previously abstracted from *American Society for Testing Materials,* Preprint No. 14. See item 12-132, 1949. (S22, Al, Mg)

239-S. Report of Committee E-3 on Chemical Analysis of Metals. *American Society for Testing Materials, Proceedings,* v. 49, 1949, p. 506-511.

Previously abstracted from *American Society for Testing Materials,* Preprint No. 73. See item 10A-104, 1949. (S11)

240-S. Butt Weld Testing With the Hughes Supersonic Flaw Detector. *Machinery* (London), v. 76, May 11, 1950, p. 667-668.

Diagram and description show principle involved. (S13)

241-S. Concerning the Standardization of Soft and Hard Solders. (In German.) Erich Lüder. *Metalloberfläche,* sec. B, v. 2, Apr. 1950, p. 56-58; May 1950, v. 4, p. 70-72.

Discusses and criticizes present standards. Compositions of successfully used soft, hard, and silver solders for noble, base, and light metals. (S22, SG-f)

242-S. Electronic Controls as Used in Finishing Steel. Richard W. Barnitz. *Blast Furnace and Steel Plant,* v. 38, June 1950, p. 649-655.

Controls used for various fabricating procedures. (S18)

243-S. The Use of the Spectroscope in the Steel Industry. E. O. Waltz. *Blast Furnace and Steel Plant,* v. 38, June 1950, p. 662-665.

Method used on samples in process. Resulting man-hour reduction and increased production. (S11, ST)

244-S. Device Sorts Steel. *Blast Furnace and Steel Plant,* v. 38, June 1950, p. 688-689.

Instrument developed by Jones & Laughlin, which separates semifinished and finished steel products that have become mixed, and differentiates between all types of carbon steel by responding to magnetic differences in the metals, regardless of whether they are chemical, physical or metallurgical. (S10, CN)

245-S. Why Machine Parts Fail. Part 2. Origin and Growth of Cracks. Charles Lipson. *Machine Design,* v. 22, June 1950, p. 111-116.

The slip theory. The three initial stages that mark crack origin; how the heat-tint method shows crack growth; and how stress reorientation influences crack direction. (S21, Q26)

246-S. A Thickness Gage for Ceramic Coatings. Charles C. Gordon and Joseph C. Richmond. *Better Enameling,* v. 21, June 1950, p. 22-23.

Previously abstracted from *Finish.* See item 231-S, 1950. (S14, L27)

247-S. Measurement of Surface Roughness. Part I. E. Green. *Finish,* v. 7, June 1950, p. 27-30.

Instruments and methods used for comparing, measuring, and delineating surface profiles of metallic materials. (To be continued.) (S15)

248-S. Eight Simple Tests Separate Stainless Grades. *Steel,* v. 126, June 19, 1950, p. 94, 96.

Nitric acid test, magnet test, spark test, hardness test, muriatic acid tests, surface spot test, nickel spot test, and stabilization test. (S10, SS)

249-S. A New Wall-Thickness Gauge for Ferromagnetic Materials. R. Berthold. *Engineers' Digest,* v. 11, May 1950, p. 162-163. Translated and condensed.

Previously abstracted from *Stahl und Eisen.* See item 195-S, 1950. (S14)

250-S. Contour and Profile Investigation. Part I. *Aircraft Production,* v. 12, May 1950, p. 161-166.

Inspection of gas-turbine components by a British firm. Includes recording of profiles on smoked glass. (To be continued.) (S15)

251-S. (Book) Spectrochemical Procedures. Charles E. Harvey. 402 pages. Applied Research Laboratories, 7707 Michigan Ave., Detroit, Mich. $7.50.

Quantitative and qualitative methods of spectrochemical analysis presented with a minimum of theory.

The procedures described are sufficiently general that they may be applied to any combination of commercial or custom-made instruments. Method principally refer to photographic instruments, although basic principles and variables apply to quantometers and visual instruments as well. (S11)

252-S. Willys Simplifies Forging Inspection. George H. Fromer. *Iron Age,* v. 165, June 22, 1950, p. 95-97.

Conveyerized magnetic-particle inspection machine which checks 600 parts per man-hr. as compared with 188 for the old method. Inspection quality is raised. Labor costs are cut 70%. (S13, ST)

253-S. Exposures for Radium Radiography of Steel. A. Morrison. *Metal Progress,* v. 57, June 1950, p. 780B.

From the accompanying graphs, exposure time required for radium radiography of steel for several popular types of film can be obtained. The graphs are a revision of data originally presented in *ASTM Bulletin,* Mar. 1944. (S13, ST)

254-S. Measurement of Surface Roughness. E. Green. *Organic Finishing,* v. 11, June 1950, p. 8-12.

Methods of assessing surface roughness and the application of the stylus instrument to the measurement of painted surfaces. (S15)

255-S. Watch Your Surface Finish. Part II. *Steel,* v. 126, June 26, 1950, p. 78-79, 90.

Development of geometric surface-finish standards in General Motors and Chrysler research laboratories to assist surface-finish control in many manufacturing operations. (S15)

256-S. Quality Control of Aluminum Alloy Castings. Richard R. Senz. *Foundry,* v. 78, July 1950, p. 64-67, 208-210.

Effects of design and of foundry practices. Inspection methods for controlling quality, and the role of statistical analysis. (S12, E general, Al)

257-S. Practical Butt Weld Inspection Using Ultrasonic Flaw Detection. A. C. Rankin. *Welding,* v. 18, May 1950, p. 199-209; June 1950, p. 243-247.

Recommended angular positions of the ultrasonic beam with respect to the welds. Typical macrographs and flaw traces. (S13, K9)

258-S. From a Metallurgist's Notebook: Broken Pressure Vessel. H. H. Symonds. *Metal Industry,* v. 76, June 9, 1950, p. 457-458.

Investigation of the cause of failure of a brass pressure vessel. No confirmation was found for the alleged cause of failure—faulty soldered joint or inferior brass. (S21, T26, Cu)

259-S. Testing and Inspection of Tool Steels. L. Sanderson. *Machinery Lloyd* (Overseas Edition), v. 22, June 10, 1950, p. 75-79, 81, 83.

Simple test procedures. Diagrams show types of sparks emitted by various ferrous alloys on bringing into contact with an abrasive wheel. (S10, TS)

260-S. Determination of Tin in Highly Alloyed Steels. *Journal of the Iron and Steel Institute,* v. 165, June 1950, p. 190-197.

The method described depends upon solution of the steel in non-oxidizing acid, separation and removal of unattacked complex alloy carbides, followed by precipitation of tin as sulfide, together with molybdenum sulfide as a "gathering" agent. The filtered sulfide precipitate is dissolved in mineral acid, and after adding iron, the hydroxides of Sn and Fe are simultaneously precipitated with ammonia. (S11, Sn, AY)

261-S. The Radiography of Heavy Metals. R. Jackson. "Handbook of Industrial Radiology", Ed. 2. (Edward Arnold & Co., London, 1949), p. 96-114. Details of recommended methods. (S13, EG-h)

262-S. The Radiography of Light Metals. W. L. Harper. "Handbook of Industrial Radiology", Ed. 2. (Edward Arnold & Co., London, 1949), p. 115-129. Details of recommended methods. (S13, Al, Mg)

263-S. Gamma Radiography. C. Croxson. "Handbook of Industrial Radiology", Ed. 2. (Edward Arnold & Co., London, 1949), p. 130-161.

Recommended procedures. 16 ref. (S13)

264-S. Some Uncommon Applications of Industrial Radiography. L. Mullins. "Handbook of Industrial Radiology", Ed. 2. (Edward Arnold & Co., London, 1949), p. 162-194.

A variety of applications, many of them with metal assemblies or connected metallurgical tests. 237 ref. (S13)

265-S. 18-8 Stainless Now Easily Classified. O. J. Winkle. *Iron Age,* v. 165, June 29, 1950, p. 80-81.

Douglas Aircraft precipitation-pickle process which allows rapid and positive identification of stabilized and nonstabilized forms of 18-8. Photomicrographs and macrographs show comparative appearances. (S10, SS)

266-S. Inspection and Testing of Welded Piping. *Heating Piping & Air Conditioning,* v. 22, July 1950, p. 110-112.

Preliminary inspection, visual inspection of work in progress, nondestructive tests of various kinds, destructive tests of selected joints, hydrostatic tests, and service tests. (S13, K9)

267-S. Designing Inspection Fixtures and Tools. W. H. Barling. *Tool Engineer,* v. 25, July 1950, p. 39-40.

Basic principles. (S general)

268-S. Nondestructive Testing of Drill Pipe. Norman Bowers. *World Oil,* v. 131, July 1, 1950, p. 87-90, 92.

Available methods and limitations of those that might be used for the inspection of new and used drill pipe. (S13, T28, ST)

269-S. Why Machine Parts Fail. Part 3. Modes of Failure. Charles Lipson. *Machine Design,* v. 22, July 1950, p. 141-145.

Analyzes reasons for various types of failure. Two basic mechanisms are ductile or shear, and brittle or normal. Seven external and two internal factors affecting mode of failure. Relationships of various factors. Typical failures. (S21, Q general)

270-S. A Metallurgical Evaluation of SAE Tool Steels. A. S. Jameson. *Iron Age,* v. 166, July 6, 1950, p. 85-87.

Evaluation is based on arbitrary ratings which are relative between or among types of steels. Selection of a particular analysis by physical properties in each group. Shown in tabular and graphical form under six basic categories, including elementary compositions and indices of merit. (S22, Q general, TS)

271-S. Radiographing and Controlled Low-Temperature Stress-Relieving of Welded Tanks for Wet Seal Gas Holder. Rudolf Kraus. *American Gas Association, Proceedings,* v. 31, 1949, p. 842-852.

Residual welding stresses in thick plate using 2-in. plates of ASTM A-70 steel. As-welded stresses, low-temperature stress-relieving, and stresses at the weld, as well as welding a 10,000,000 cu. ft. holder, radiographing, and stress-relieving in the field. (S13, J1, K general, AY)

272-S. Report of Committee A-1 on Steel. *American Society for Testing Materials,* Preprint 1, 1950, 36 pages.

Besides miscellaneous committee recommendations, report includes tentative specifications for sheet piling and heat treated steel tires and tentative methods and definitions for mechanical testing of steel bars. (S22, Q general, ST)

273-S. Report of Committee A-9 on Ferro-Alloys. *American Society for Testing Materials,* Preprint 5, 1950, 6 pages.

Includes recommendations affecting standards on ferro-alloys. (S22, Fe-n)

274-S. Report of Committee B-5 on Copper and Copper Alloys, Cast and Wrought. *American Society for Testing Materials,* Preprint 11, 1950, 8 pages.

Miscellaneous recommendations concerning test methods, specifications, and standards. (S22, Cu)

275-S. Report of Committee B-7 on Light Metals and Alloys, Cast and Wrought. *American Society for Testing Materials,* Preprint 13, 1950, 12 pages.

Includes recommendations affecting standards for cast and wrought Al and Mg-base alloys also proposed tentative specifications for Al alloy die forgings. (S22, Al, Mg)

276-S. Report of Committee E-3 on Chemical Analysis of Metals. *American Society for Testing Materials,* Preprint 102, 1950, 12 pages.

Miscellaneous committee recommendations. (S11)

277-S. Some Considerations in the Provision and Operation of an Overseas Mail Service. James Gray. *Institution of Mechanical Engineers, Proceedings,* v. 162, No. 1, 1950, p. 1-12.

Engineering considerations of ship operation, with emphasis on service failures of engine and other parts. Major difficulty was encountered in connection with piston-rod fatigue failures. Trouble was alleviated by substitution of a crosshead of improved design. (S21, Q7, T22, ST)

278-S. Preparation of Stanniferous Materials for Analysis. A. G. Arend. *Industrial Chemist and Chemical Manufacturer,* v. 26, June 1950, p. 270-271, 274.

Wide variety of tin-bearing residues which are subjected to refining for their metal content. Methods for overcoming the difficulties of sampling such residues, which are much greater than in the case of metaliferous ores. (S11, Sn)

279-S. A Note on Precision in Metallurgical Analysis. Ernest H. S. van Someren. *Metallurgia,* v. 42, June 1950, p. 52.

Results obtained by different workers using different methods for alloying elements in standard steels. (S11, ST)

280-S. Sampling of Pig Iron and Cast Iron for Chemical Analysis. W. Westwood. *British Cast Iron Research Association Journal of Research and Development,* v. 3, June 1950, p. 377-380.

Recommended procedures. (S11, CI)

281-S. Determination of Carbon in Low-Carbon Ferrous Alloys by Means of Turbidimetric Analysis. (In French.) P. Agassant and J. L. Andrieux. *Bulletin de la Société Chimique de France,* Mar.-Apr. 1950, p. 253-254.

Results of investigation of a series of alloys with carbon contents between 0.015 and 0.10% indicate applicability of the method, said to be very simple and having an accuracy comparable to that of the gravimetric method. (S11, Fe)

282-S. Study of Methods for Qualitative and Quantitative Analysis of Copper-Beryllium Alloys. I. Chemical Analysis. II. Physical Methods of Analysis. III. Emission Spectrophotometry. (In French.) Maurice Séguin and Lucien Gramme. *Bulletin de la Société Chimique de France,* Mar.-Apr. 1950, p. 375-400.

Review of existing methods, plus experimental evaluation of some of them, with emphasis on methods which are selective, simple, rapid, and accurate. Part III describes a new spectrophotometric apparatus, claimed to be as accurate, yet much simpler than the complicated apparatus usually used. 134 ref. (S11, Cu)

283-S. New Optical Measuring Instruments for Inspection of Parts and Materials. (In German.) Albert Metz. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, May 1, 1950, p. 323-331. (S14)

284-S. A Simple Quantitative Determination of the Degree of Reduction of Metal Powders and Semiconducting Powders. (In German.) Franz Skaupy. *Zeitschrift für anorganische Chemie,* v. 262, May 1950, p. 109-112.

Performed by dissolving the sample in a $FeCl_3$ solution and titrating the resulting bivalent iron with permanganate. (S12, H11)

285-S. Spectrographic Determination of Silicon in Cast Iron. (In Polish.) Z. Karlinski and J. Czakow. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 1, No. 2, 1949, p. 139-145.

Details of simple and rapid method. 11 ref. (S11, Si CI)

286-S. Quality Control: A New Field for Instrumentation. T. R. Hand and C. J. Falk. *General Electric Review,* v. 53, July 1950, p. 20-23.

Apparatus and procedures by which statistical quality control can be handled by instruments. The quality-control indicator consists of two basic units: a "totalizer", which counts total production and a "characteristic analyzer", which counts the number of units rejected for a given test. The computer compares these counts according to the mathematical formula, and the result is indicated on the "quality" meter of the characteristic analyzer. (S12)

287-S. Simple, Rapid Method of Producing Thermocouple Junctions. Karl F. Hager, Morris Rosenthal, and Werner Ross. *Oil and Gas Journal,* v. 49, July 13, 1950, p. 87-89.

In the process described, welding is accomplished by heat from an arc formed at the moment of contact between the thermocouple junction to be welded and an oil-covered mercury surface. The mercury and the thermocouple wires are connected to opposite poles of a source of current. (S16)

288-S. The Response of Thermocouples to Rapid Gas-Temperature Changes. M. W. Carbon, H. J. Kutsch, and G. A. Hawkins. *Transactions of the American Society of Mechanical Engineers,* v. 72, July 1950, p. 655-657.

Experimental and theoretical data for response time of thermocouples ranging in wire size from 0.01 to 0.0005 in. The experiments were performed at temperatures from 70 to 950° F., and at air velocities of 0-125 fps. An equation is presented for computing response time for thermocouples fabricated from fine wires and subjected to sudden air-temperature changes. **(S16)**

289-S. Thermal Cracks in Turbine and Generator Rotor Forgings. A. W. Rankin, C. J. Boyle, C. D. Moriarty, and B. R. Seguin. *Mechanical Engineering,* v. 72, July 1950, p. 559-566.

Results of ultrasonic testing of large rotor forgings, with special emphasis on the need for careful interpretation, since nonmetallic inclusions cause reflections similar to cracks. A tabulation shows some general identifying characteristics of thermal cracks and nonmetallic inclusions. Spin tests resulting from thermal cracks of the size and distribution found in the investigation. (S13, T25)

290-S. Ultrasonics and Their Use for Non-Destructive Testing of Materials. N. G. Neuweiler. *Microtechnic,* v. 4, Jan.-Feb. 1950, p. 37-44.

Fundamental principles and applications. (To be continued.) (S13)

291-S. Optical Determination of the True Temperature of Luminescent Flames. (In German.) Fritz Rössler. *Zeitschrift für angewandte Physik,* v. 2, Apr. 20, 1950, p. 161-166.

Proposed method overcomes the difficulty of measuring the temperature of "nonblack" radiant bodies by optical pyrometry. The principle of the method, illustrated with Hefner's candle as an example, is based on the fact that soot particles, which make flames continuously luminescent, have the same temperature as the gases of the flame. 16 ref. (S16)

292-S. (Book) **Industrial Inspection Methods.** Rev. ed. Leon C. Michelon. 566 pages. 1950. Harper & Bros., New York 16, N. Y. $6.00.

Replaces 1942 edition. A basic but comprehensive presentation of principles and practices of industrial inspection work as it exists today. Major divisions of the work are concerned with basic concepts, dimensional control, testing for physical and mechanical properties, surface inspection, and inspection organization and personnel. (S general)

293-S. (Book) **A.S.T.M. Specifications for Steel Piping Materials,** Ed. 7. 328 pages. American Society for Testing Materials, 1916 Race St., Philadelphia 3. $3.00 (to A.S.T.M. members $2.25).

Latest compilation includes some 50 widely used specifications. Materials covered include: pipe used to convey liquids, vapors and gases at normal and elevated temperatures, still tubes for refinery service, heat exchanger and condenser tubes, and boiler and superheater tubes as well as castings, forgings, bolts, and nuts. (S22, ST)

294-S. (Book) **A.S.T.M. Specifications for Steel Flat Products.** 198 pages. (p. 311-508). Mar. 1950. American Society for Testing Materials, 1916 Race St., Philadelphia 3. $2.25 (to A.S.T.M. members $1.75.).

The various A.S.T.M. specifications pertaining to steel plate, sheet and strip materials, including those for steel flat products for structural purposes and for boilers and pressure vessels, prepared by Committee A-1 on Steel; also other specifications developed by Committees A-10, A-2 and A-5 on stainless flat products, wrought iron, and metallic coated sheets. (S22, ST)

295-S. (Book) **Ausgewählte Chemische Untersuchungsmethoden für die Stahl-und Eisenindustrie.** (Selected Chemical Research Methods for the Steel and Iron Industry.) Otto Niezoldi. 184 pages. 1949. Springer-Verlag, Berlin, Gottingen, and Heidelberg, Germany.

Analytical procedures, divided into four parts. Part I: Steel, iron, and ferrous alloys. Part II: Nonferrous metals and alloys. Part III: Auxiliary materials, such as fuels, slags, refractories, etc. Part IV: Solutions for chemical analysis. (S11, ST)

296-S. Why Industry Misses Atom Opportunities. *Modern Industry,* v. 20, July 15, 1950, p. 48-51.

Indicates why many companies which could use radioisotopes in research and production fail to do so. Typical uses, equipment and procedures, and safety precautions. (S19)

297-S. Low-Cost Inspection Method Finds Metal Surface Flaws. *Steel,* v. 127, July 24, 1950, p. 68, 70.

Dye-penetrant technique which employs inexpensive, portable equipment to detect minute surface openings in ferrous and nonferrous metals. (S13)

298-S. The Defective Part Stays on Receiving Dock Due to New Testing Plan at Byron-Jackson Plant. *Western Metals,* v. 8, July 1950, p. 31-32.

Use of Dy-Chek inspection process. (S13)

299-S. Problem of Decarburization in Railroad Materials. Ray McBrian. *Metal Progress,* v. 58, July 1950, p. 51-54.

Argues that producers of railroad equipment are not taking proper precautions to avoid or allow for decarburized surfaces in as-rolled or as-forged metal. Photomicrographs show decarburization of four standard rails, showing wide variation of American production. Typical failures and fatigue cracks in rails are illustrated. Concludes that decarburization is responsible for most fatigue failures. (S21, J28, Q7, T23, CN)

300-S. Exposures for Cobalt-60 Radiography of Steel. A. Morrison. *Metal Progress,* v. 58, July 1950, p. 80B.

Charts are reprinted from article in *Nucleonics.* See item 8-S, 1950. (S19, S13, ST)

301-S. Induction Unit Speeds Carbon Analysis. E. R. Millen and R. M. Vredenburg *Iron Age,* v. 166, July 27, 1950, p. 68-72.

How carbon contents of steel, cast irons, and other ferrous alloys in the range 0.05-3.0% can be determined rapidly with a high-frequency induction-heated instrument. Completely automatic unit operates

successfully for both gravimetric and volumetric analyses. (S11, ST, CI)

302-S. Materials Problems in Production Solved With Microscope. R. Wachtell. *Materials & Methods,* v. 32, July 1950, p. 49-51.

Series of case histories showing value of the microscope as a trouble-shooting tool. (S13, M21, M28)

303-S. Apply Radioisotope—Cobalt 60—to Radiography of Castings. Herbert R. Isenburger. *American Foundryman,* v. 18, July 1950, p. 48-49.

Procedures. Includes direct-reading exposure chart for gamma radiography. (S19)

304-S. Turbine Blade Contours Checked in Seconds. *Steel,* v. 127, July 31, 1950, p. 66.

Instrument indicates accuracy of 18 points at once and is designed to handle a variety of blade designs and dimensions. (S14)

305-S. Magnetic Particle Inspection; the 1949 Lester Lecture. L. A. Danse. *Non-Destructive Testing,* v. 8, Spring 1950, p. 7-12.

Development, procedures, equipment, and applications. (S13)

306-S. Current Applications of Magnetic Analysis Inspection. V. L. Spoley. *Non-Destructive Testing,* v. 8, Spring 1950, p. 20-23.

Equipment and procedures. Micrographs show typical structures revealed. (S13)

307-S. Ultrasonics and Their Use for Non-Destructive Testing of Materials. (Concluded.) N. G. Neuweiler. *Microtecnic,* v. 4, Mar.-Apr. 1950, p. 60-66.

Basic operating principles of the Hughes ultrasonic flaw detector, as well as the actual equipment, including the filter system. Typical results on steel forgings. (S13, ST)

308-S. The E.M.F.-Temperature Calibration of Platinum, 10% Rhodium-Platinum and Platinum, 13% Rhodium-Platinum Thermocouples Over the Temperature Range 0°-1,760° C. C. R. Barber. *Proceedings of the Physical Society,* v. 63, sec. B, July 1, 1950, p. 492-503.

Tables are based on the calibration of 12 thermocouples of each kind, 6 from each of two manufacturers. Each set of 6 thermocouples comprised 2 samples from each of 3 batches of wire. (S16)

309-S. Graphical Estimation of Inspection Errors. F. Levi. *Engineer,* v. 190, July 7, 1950, p. 2-5.

Effect of this possible error is examined in conjunction with some inspection procedures designed to screen faulty articles from controlled productions of a particular type. The approximate percentage of faulty articles accepted and of satisfactory articles rejected by a given inspection procedure is estimated graphically. (S12)

310-S. Contour and Profile Investigation. Part II. Work-Holding Devices; Comparator Equipment and Special-Purpose Optical Apparatus for Dual Projection. III. Epidiascope-Type Filing Projector; Checking Fir-Tree Roots. *Aircraft Production,* v. 12, June 1950, p. 192-197; July 1950, p. 232-234.

Techniques and equipment developed at D. Napier and Son, Ltd., for inspection of gas-turbine blades and similar work. (S15)

311-S. Experiences in the Application of Spectrographic Analysis in the Grey-Iron Foundry. E. J Ronnie and M. M. Hallett. *Institute of British Foundrymen,* Paper No. 965, 1950, 7 pages (Advance Copy).

Applicability, equipment, organization of work, and cost. Preparation of sample, sparking technique, photographing processing technique, plate calibration, accuracy, analysis of high-alloy and pig irons, and special applications. (S11, CI)

312-S. Polarographic Analysis in Metallurgy. (In Italian.) Giovanni Semerano. *Metallurgia Italiana,* v. 42, Apr. 1950, p. 121-128.

The various quantitative methods, with special attention to a recently developed one, giving limits of precision and applicability. Various cases for which polarography has been shown to be particularly suited: analysis of metals and alloys; analysis of protective coatings; and study of corrosion. 101 ref. (S11, R11)

313-S. Localization of Defects by Means of X-Rays. (In Italian.) Francesco Baldi. *Metallurgia Italiana,* v. 42, Apr. 1950, p. 133-136.

Method based on use of two radiographs on separate films. 13 ref. (S13)

314-S. Determination of the Quality of Heat Treatment of Steel by an Electroinductive Method. (In Czech.) Adolf Pokorny. *Hutnické Listy,* v. 5, May 1950, p. 185-196.

Tool and high speed steels show characteristic hysteresis loop shapes, which vary with composition and heat treatment. By means of 180 different examples (complete details of composition and heat treatment given for each; and hysteresis loops reproduced photographically), means for determin-

ing quality of heat treatment and compositional variations are indicated. (S general, J general, TS)

315-S. Determination of Sulfur in Iron and Steel. (In Japanese.) T. Inoue. *Journal of the Casting Institute of Japan,* v. 21, no. 8, 1949, p. 9-14.

Experimental investigation of the sulfur-print method, using different grades of photographic paper and different printing methods. (S11, Fe)

316-S. Open Hearth Bath Temperature Measurement and Control. J. A. Creighton. *Journal of Metals,* v. 188, Aug. 1950, p. 980-981.

Pyrometric practice using thermocouples for measurement of molten metal temperatures at Bethlehem Steel Co.'s Lackawanna plant. Use of the system is believed to have improved mold life, stool life, pouring practice, and steel quality. (S16, D2, ST)

317-S. Ultrasonics Determine Life of Diesel Engine Crankshaft. *Iron Age,* v. 166, Aug. 3, 1950, p. 78. (S13, ST)

318-S. Why Machine Parts Fail. Part 4. Fatigue Fractures. Charles Lipson. *Machine Design,* v. 22, Aug. 1950, p. 157-160.

Several basic fracture patterns which can often be recognized. How to identify them and to determine the type of loading or defect responsible for the particular failure. (S21, Q7)

319-S. New Inspection Technique Developed. Thomas A. Dickinson. *Steel Processing,* v. 36, July 1950, p. 351, 369.

Dye-penetrant or "Dy-Chek" method developed by Northrop Aircraft, Hawthorne, Calif. (S13)

320-S. Recording Surface Finish and Wear of Gear Teeth. J. W. Sawyer and J. G. McCubbin. *Machinery* (American), v. 56, Aug. 1950, p. 135-142.

Various methods used for studying roughness and progressive wear of gear teeth—their relative merits and limitations. (S15, Q9)

321-S. Turbine-Blade Contours Rapidly Checked With Air Gage. *Machinery* (American), v.56, Aug. 1950, p. 143.

Production-line device. (S14)

322-S. Dye Method of Finding Surface Flaws in Metal Parts. *Machinery* (American), v. 56, Aug. 1950, p. 171-172.

Method developed by Turbodyne Corp., a subsidiary of Northrop Aircraft. (S13)

323-S. Surface Finish Control. C. R. Lewis. *Product Engineering,* v. 21, Aug. 1950, p. 91-95.

Realistic approach to the old problem of surface-finish specification, including a discussion of new SAE standards and of various effects below the surface of metals caused by different finishing operations. (S15, L general)

324-S. Surface Finish Definitions and Standards. *Product Engineering,* v. 21, Aug. 1950, p. 163, 165, 167.

Based on surface finish section of the new SAE Automotive Drafting Standards. (S15)

325-S. Metal Specifications for the Brass and Bronze Foundry. James G. Dick. *Canadian Metals,* v. 13, July 1950, p. 24, 26-29, 46.

Specifications developed by Canadian Bronze Co. Ltd., Montreal, Canada. (S22, E general, Cu)

326-S. That Specification: Master or Servant? With Particular Examples From the Cold-Rolled Non-Ferrous Industry. Thomas B. Crow. *Metallurgia,* v. 42, June 1950, p. 14-17; July 1950, p. 59-63.

Discusses "the specification habit" —slavish adherence to specifications without consideration of possible extenuating factors. Relation of the specification to the job, ambiguity of temper designations, American practice, and specially compiled specifications. Some B.S.I. specifications. (S22)

327-S. Density of Radiographs. *Foundry Trade Journal,* v. 89, July 20, 1950, p. 69-71.

With particular reference to the use of radiography in the nondestructive testing of castings. (S13)

328-S. Surface Defects Encountered in "Watchmaker's" Brass. (In French.) J. Hérenguel. *Revue de Métallurgie,* v. 47, June 1950, p. 455-464.

A laboratory study to determine the exact nature of such defects and their causes. Several types of brass commonly used in the watch industry were investigated. Macrographs and micrographs illustrate types of defects encountered and their microstructure. (S13, M27, Cu)

329-S. Application of Immersion Pyrometers in French Steel Works. (In French.) G. Husson and P. Rodica. *Revue de Métallurgie,* v. 47, June 1950, p. 477-484.

Use for temperature measurement of molten steel. Apparatus and typical results. (S16, ST)

330-S. Metallic Temperature Indicating Bodies for Controlling Maximum Temperatures in Ceramic Kilns. (In German.) K. W. Fröhlich. *Berichte der Deutschen Keramischen Gesellschaft e.V. und des Vereins Deut-*

scher Emailfachleute e.v., v. 27, Jan.-Feb. 1950, p. 17-23.

Commonly used methods of measuring and controlling temperatures. Use of metal blocks which, depending on composition, soften and melt, like Seger cones, at specific temperatures. Compositions are not given. (S16)

331-S. Domestic Research on Surface Quality. (In Russian.) P. E. D'yachenko. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Apr. 1950, p. 4-9.

The standardization of surface quality of metals, and the significance of the designations used in Russia. Difference between "roughness" and "waviness". Methods and devices for measuring surface microgeometry and ranges of applicability for several of the most widely used systems. Hardness contours are charted in and near typical metal-cutting chips still attached to the base metal. (S15, G17)

332-S. Contact-Induction Method of Measuring Linear Dimensions. (In Russian.) S. V. Rozhnov and N. N. Genchev. *Stanki i Instrument* (Machine Tools and Equipment), v. 21. Apr. 1950, p. 12-15.

Specially designed apparatus for control of dimensions which combines the electrical-contact and inductive methods. Electric circuits are also presented for special modifications of the device for control of cylindrical dimensions and for use during polishing. (S14)

333-S. Certain Structural Defects of Micrometers. (In Russian.) G. P. Malimov. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, May 1950, p. 18-20.

Causes of inaccuracy of micrometers and suggested means of minimizing it. Probable range of accuracy for various types of materials and basic shapes. An extra attachment enables the spindle to achieve backward and forward movement without backlash. (S14)

334-S. Causes of Tool Failures. I. Mechanical Factors, J. Y. Riedel. *Metal Progress,* v. 58, Aug. 1950, p. 171-175.

Factors related to design, mechanical processing, and service loads. Failures due to steel defects, to grinding checks, to heat checks, to rapid wear, and to premature breakage. (S21, Q general, TS)

335-S. Precision Thermostat for High Temperatures. *Technical News Bulletin* (National Bureau of Standards), v. 34, Aug. 1950, p. 105-107.

Thermostat which provides smooth, continuous control of an electric furnace within a very small range at temperatures between 1000 and 1550° C. The furnace winding itself serves as the sensitive element, forming part of a bridge circuit for control of a thyratron tube. The thyratron circuit then acts as a continuously variable valve. (S16)

336-S. Spectrographic Analysis in the Grey-Iron Foundry. E. J. Ronnie and M. M. Hallett. *Foundry Trade Journal,* v. 89, Aug. 3, 1950, p. 115-121; discussion, p. 121-123.

Practical experiences during the last two years. (S11, E general, CI)

337-S. Measuring of Small and Smallest Holes; Two New Measuring Methods. Rudolf Lehmann. *Microtecnic,* v. 4, Mar.-Apr. 1950, p. 97-106. Translated from the German.

Various gaging methods, especially for diameters below 2 mm. (To be continued.) (S14)

338-S. (Book) **Manual of Spectroscopy.** Theodore A. Cutting. 245 pages. 1949. Chemical Publishing Co., 26 Court St., Brooklyn 2, N. Y. $6.50.

Directions for analysis of ores, minerals, alloys and inorganic chemicals. Key lines for each element have been selected and a chart is included which shows the spacing of spectral lines and their wavelengths. A chapter is devoted to the building of spectrographic instruments. (S11)

339-S. Cobalt 60 for Low Cost Radiography. William Czygan. *Iron Age,* v. 166, Aug. 24, 1950, p. 68-72.

Use of cobalt 60 produces results equivalent to those obtained with costlier radium. Procedure and recommended practices. (S13, Co)

340-S. Hafnium-Zirconium and Tantalum-Columbium Systems; Quantitative Analysis by X-Ray Fluorescence. L. S. Birks and E. J. Brooks. *Analytical Chemistry,* v. 22, Aug. 1950, p. 1017-1020.

The X-ray fluorescence method was adapted for determination of small amounts of Hf in Zr and Ta in Cb. Curves of relative intensity of spectral lines are plotted against percentage composition.
(S11, Zr, Cb)

341-S. Ultraviolet Spectrophotometric Determination of Molybdenum. George Telep and D. F. Boltz. *Analytical Chemistry,* v. 22, Aug. 1950, p. 1030-1031.

(S11, Mo)

342-S. Specific Spot Test for Gold Employing Pararosaniline Hydrochloride. Philip W. West and Jack K. Carlton. *Analytical Chemistry,* v. 22, Aug. 1950, p. 1055-1056.

Development of method, including results of extensive interference studies. (S10, Au)

343-S. Liquid Iron and Steel Temperatures in Practice. T. B. Winkler. *Industrial Heating,* v. 17, Aug. 1950, p. 1380, 1382, 1384. (A condensation.)

Development of a bath-immersion thermocouple suitable for use in the blast and openhearth furnaces. Effects of additions to the bath on temperature, drop during pouring, formation of ladle skulls, and overall temperature loss from blast to openhearth furnace. (S16, D1, D2, ST)

344-S. Quantitative Paper Chromatography on Mixed Solutions of Nickel and Cobalt, and Determination of Both Elements. A. Lacourt, J. Gillard, M. Van Der Walle. *Nature,* v. 166, Aug. 5, 1950, p. 225-226.

(S11, Co, Ni)

345-S. White Fluid for Magnetic Crack Detection. *Machinery* (London), v. 77, Aug. 10, 1950, p. 183-184.

Experiments using Al powder in paraffin for dark surfaces. (S13)

346-S. Investigation of Surface Processes by Means of Radioactivity. (In German.) Hans Frauenfelder. *Helvetica Physica Acta,* v. 23, June 20, 1950, p. 347-380.

New methods for measuring desorption probabilities, sticking coefficients, and surface-diffusion coefficients by use of radioactive substances. Applications to nuclear physics are in rapid separation of radioactive elements and preparation of very thin sources. Includes specific information on surface diffusion of Cu. 65 ref. (S19, P10)

347-S. Radioactive Isotopes of Iron and Their Application in Chemistry and Biology. (In Russian.) V. I. Gol'danskii and M. B. Neiman. *Uspekhi Khimii* (Progress in Chemistry), v. 19, May-June 1950, p. 320-341.

Discusses, on the basis of the literature, physical characteristics of iron isotopes, Fe^{52} to Fe^{60}, production of test specimens of radioactive Fe, and application in chemistry, metallurgy, biochemistry, and biology. 114 ref. (S19, Fe)

348-S. Improved Method Developed for Mass Inspection of Metals. *Production Engineering & Management,* v. 26, Sept. 1950, p. 79.

Dy-Chek dye-penetrant process developed by Northrop Aircraft. (S13).

349-S. Visual Inspection Method for Light Metals. *Light Metal Age,* v. 8, Aug. 1950, p. 16-17.

Use of Dy-Chek dye-penetration method. (S13, Al, Mg)

350-S. Nondestructive Inspection Locates Minute Surface Cracks, Flaws in Metals. D. H. Stormont. *Oil and Gas Journal,* v. 49, Sept. 7, 1950, p. 69, 77.

"Dy-Chek" dye-penetrant method. (S13)

351-S. Weld Inspection Is Facilitated by the Development of an Economical New Method of Flaw Detection. Gilbert C. Close. *Industry & Welding,* v. 23, Sept. 1950, p. 30-31, 34, 46.

The Dy-Chek (dye-penetrant) method. (S13)

352-S. Why Machine Parts Fail. Part 5. Bending and Tensile Fractures. Charles Lipson. *Machine Design,* v. 22, Sept. 1950, p. 147-150.

How to recognize failures resulting from bending and axial loads. (S21, Q26)

353-S. Screwshaft Casualties — The Influence of Torsional Vibration and Propeller Immersion. S. Archer. *Journal of the American Society of Naval Engineers,* v. 62, Aug. 1950, p. 715-743. Reprinted from *Transactions of the Institute of Marine Engineers,* Jan. 1950.

Statistical and experimental survey. Various examples of failed shafts. Possible causes and conclusions. (S21, Q1, ST)

354-S. Automotive Cast Irons. Richard G. McElwee. *Foundry,* v. 78, Sept. 1950, p. 90-91, 214.

Specifications and trends. (S22, T21, CI)

355-S. Some Notes on Propeller Shaft Failures. Arthur R. Gatewood. *Marine Engineering and Shipping Review,* v. 55, Sept. 1950, p. 65-70. (A condensation.)

Cracks and failures and their causes. (S21, Q26, ST)

356-S. Gold Plate — A Subject for Controversy. Donald Wood, G. R. Frankovich, E. A. Parker, Karl Schumpelt, and Louis Weisberg. *Plating,* v. 37, Sept. 1950, p. 945-948.

Discusses Trade Practice Rules established by the Federal Trade Commission. Limitations are set for use of the word "gold" for gold alloys and for minimum thickness of gold necessary in order that the term "gold electroplated" may be used. The regulations are criticized on technical and commercial bases. (S22, L17, Au)

357-S. The Use of the Spectroscope in the Steel Industry. E. O. Waltz.

Year Book of the American Iron and Steel Institute, 1950, p. 370-379; discussion, p. 379-382.

Previously abstracted from *Blast Furnace and Steel Plant.* See item 243-S, 1950. (S11, ST)

358-S. Recent Developments in the Non-Destructive Testing of Materials by Electrical and Magnetic Methods. W. Jellinghaus. *Engineers' Digest,* v. 11, Aug. 1950, p. 271-275. Translated and condensed from *Stahl und Eisen,* v. 70, June 22, 1950, p. 552-560.

Principles, improvements, advantages and disadvantages, and applications of electrical and magnetic methods of nondestructive testing. Also oil-bath, fluorescence, and thermal methods. 15 ref. (S13)

359-S. The Spectrographic Analysis of Magnesium in Ferrous Materials. A. Argyle. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Aug. 1950, p. 521-522.

Procedure. (S11, Fe, Mg)

360-S. An Electro-Deposited Surface Roughness Standard. P. M. Aitchison. *Australian Journal of Applied Science,* v. 1, Mar. 1950, p. 71-74.

Standard consists of a lapped steel block on which are deposited thin strips of Cr of specified width, spacing, and height. This provides a known surface for use in the calibration of stylus-type, surface finish measuring instruments. (S15)

361-S. The Technique and the Possibilities of Control by Fluorescence. (In French.) R. Crédeville and H. Granjon. *Soudure et Techniques Connexes,* v. 4, May-June 1950, p. 117-118, 125. Theoretical bases of use of fluorescence for defect detection. Apparatus and procedure, with emphasis on use for control of welds. (S13)

362-S. Nephelometric Determination of Oxygen Content of Molten Steel. (In Czech.) Miroslav Sicha. *Hutnické Listy,* v. 5, June 1950, p. 234-239.

The method and its application to 55 typical samples. Time required is 12-15 min. A modification of Herty's sampling method. (S11, ST)

363-S. Polarographic Determination of Molybdenum in Steel. (In Polish.) M. Stepien. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 2, no. 2, 1950, p. 89-92.

New method claimed to have marked advantages, including great accuracy, low reagent consumption, and necessity for ignition of the residue. (English abstract gives gist of procedure.) (S11, ST, Mo)

364-S. A New Coating Thickness Measuring Instrument. *Metal Finishing,* v. 48, May 1950, p. 64-66.

Electromagnetic device energized by standard 110 volt a.c. It is relatively insensitive to normal voltage variation, and is rapid, yet accurate. (S14)

365-S. Electronic Gages Solve Various Problems. David Fidelman. *American Machinist,* v. 94, Sept. 18, 1950, p. 95-99.

Various applications: measuring speed and accuracy on close-limit tolerances are inherent. Gaging of work that moves continuously, checking coating thickness, and measuring wall thickness when only one side of the work is accessible are some of the uses. (S14)

366-S. New Process Checks Hardness Electronically. Chester Ricker. *American Machinist,* v. 94, Sept. 18, 1950, p. 118-120.

Automatic electronic tester with mechanized parts handling which permits 900% production increase in Chevrolet rocker arms. Machine eliminates human errors in nondestructive testing of heat treated ferrous materials. (S13, Q29, CN)

367-S. Analysis of Uranium Ores by Geiger Methods. *Canadian Mining and Metallurgical Bulletin,* v. 43, Aug. 1950, p. 461-464; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 53, p. 324-327.

A method which eliminates errors due to loss of radiation equilibrium. Beta and gamma activities are measured simultaneously in one simple operation. This method is recommended for assaying samples from milling operations. A third method is recommended for analysis of exploration samples and diamond drill cores. (S11, U)

368-S. Equilibrium Corrections in Geiger Analysis. C. LaPointe. *Canadian Mining and Metallurgical Bulletin,* v. 43, Aug. 1950, p. 465-468; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 53, p. 328-331. β-ray and γ-ray methods. Explains inaccuracies due to disturbance of the secular equilibrium between the radioactive elements of the uranium family, caused by the milling process. Method of correction suitable for routine determinations. (S11, U)

369-S. Temperature Measurements in the Basic Arc Furnace. C. B. Post and D. G. Schoffstall. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 75-85; discussion, p. 85-89.

Summarizes experience at Carpenter Steel Co., with the optical pyrometer (1926-1947), the immersion thermocouple (1946-1948), and the present standard method, the Leeds and Northrup immersion Rayotube. (S16, D5)

370-S. Measuring Temperature of Molten Steel With Platinum Immersion Thermocouple. D. G. Harris. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 89-90; discussion, p. 90.

Advantages in accuracy and cost reduction. Developments and improvements made by Republic Steel Corp., Massillon, Ohio. (S16, D general)

371-S. Applications of Temperature Measurements at Duquesne. George E. Wagner. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 91-92; discussion, p. 98-99.

Temperature control at the Duquesne works of the Carnegie-Illinois Steel Corp. Correlation of three methods: optical pyrometer, immersion thermocouple, and experienced judgment of the melter foremen. (S16, D general)

372-S. Relative Accuracy and Cost of Using Immersion Thermocouples for Steel-Bath Temperature Control. J. G. Mravec. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 93-94; discussion, p. 98-99.

Experience at the Steel and Tube Div., Timken Roller Bearing Co. (S16, D general)

373-S. Temperature Measurement in the Electric Furnace at Atlas Steels Ltd. G. C. Olson. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 94-98; discussion, p. 98-99.

Value of the optical pyrometer. Experimentation with immersion thermocouples. Concludes that the immersion Rayotube, requiring less maintenance and giving less chance of faulty readings, provides better control. (S16, D5)

374-S. Temperature Measurement and Fluidity Tests. G. A. Lillieqvist. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 99-102; discussion, p. 102-104.

Mold assembly and temperature measurement equipment developed by American Steel Foundries, East Chicago, Ind. Results of fluidity tests are plotted for plain carbon and intermediate manganese steel. (S16, E25, CN, AY)

375-S. Temperature Measurement and Temperature Control in Steel Foundries. J. F. B. Jackson. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 104-106; discussion, p. 106-107.

Development and use of immersion thermocouple pyrometry in England. Advantages and disadvantages of the method. (S16, D general)

376-S. Melting Control With the Direct-Reading Spectrometer. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 107-110.

Use at Timken Roller Bearing Co., on alloy steel melts. (S11, D general, AY)

377-S. Precision of Spectrographic Analyses of Steel. P. R. Irish. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 110-117.

Procedure used by Bethlehem Steel Co. Variation of precision analysis with computing method, density difference of line pairs, and with wave-length separation. Overall precision. (S11, ST)

378-S. Routine Spectrochemical Analysis in the Ford Motor Company. G. A. Nahstoll. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 117-118.

The foundry, openhearth, and mobile laboratories. Analysis is applied to both iron and steel. (S11, Fe, ST)

379-S. Use of the Spectrograph in the Analysis of Special Steels. M. L. Windle and W. H. Magrun. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 119-121.

Use at Simonds Saw and Steel Co., Lockport, N. Y., as applied to alloy steels. Results of precision tests. Advantages of the spectrograph. (S11, AY)

380-S. Spectrographic Analysis of High-Alloy Steels. D. G. Schoffstall. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 122-124.

Procedure used by Carpenter Steel Co. Costs of spectrographic and chemical analyses and advantages of the spectrograph. (S11, AY)

381-S. Spectrographic Analysis by Copperweld. A. C. Hale. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 124-125.

Use of a Bausch and Lomb large Littrow spectrograph with a University of Michigan power source and microphotometer for alloy steels. (S11, AY)

382-S. Spectrographic Analysis at the American Cast Iron Pipe Company. W. R. Kennedy. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 125-126.

Procedure, precision, and cost for alloy steels. (S11, AY)

383-S. Spectroscopy at Canton Division, Republic Steel Corporation. E. O. Waltz. *Electric Furnace Steel Conference, Proceedings,* v. 7, 1949, p. 127.

Performance of unit for all types of steels. (S11, ST)

384-S. Methods of Crack Detection. Charles Lipson. "Handbook of Experimental Stress Analysis", John Wiley

& Sons, New York, 1950, p. 579-592.
Devoted for the most part to magnetic, supersonic, and electrical methods; others are outlined. (S13)

385-S. Quantitative Spectrochemical Analysis of Ashes, Deposits, Liquids, and Miscellaneous Samples. Edwin K. Jaycox. *Analytical Chemistry,* v. 22, Sept. 1950, p. 1115-1118.
General technique applicable to a wide variety of materials. Sample preparation, incorporation of spectrochemical buffers, and excitation procedures. (S11)

386-S. An Inexpensive High-Temperature Thermostat. F. G. Morris. *Journal of Scientific Instruments,* v. 27, Sept. 1950, p. 254.
Thermostat for controlling the temperature of an electrically heated furnace or salt bath up to 1000° C. (S16)

387-S. More Uses for Radioactive Tracers. *Iron Age,* v. 166, Sept. 28, 1950, p. 73.
Method described by J. Kronsbein at the recent AES Convention in Boston for measuring thickness of very thin deposits and for accurate tracing of current distribution. (S19, L17)

388-S. Electronic Inspection of Engine Cam Contours. Michael G. Turkish. *Electronics,* v. 23, Oct. 1950, p. 74-77.
A system in which a cam pushes a rod-shaped permanent magnet back and forth inside a pickup coil to generate voltage proportional to velocity, for viewing on a cathode-ray screen to reveal contour errors. The system can also be used directly on engines to study valve motion at high speeds. (S14)

389-S. Ultrasonics Brings 100% Inspection to Power Piping. W. B. Bunn and W. J. Mitchell. *Power,* v. 94, Oct. 1950, p. 102-104, 164, 167, 202.
Use to detect hidden flaws before pipe leaves the shop. (S13, ST)

390-S. Are You Overlooking Ferromagnetic Analysis. J. K. Stanley. *Steel,* v. 127, Oct. 2, 1950, p. 88-92.
Shows that magnetic measurements are extremely valuable in interpreting metallurgical phenomena in nondestructive testing, stress analysis, and in structural studies. (S13, Q25, M23)

391-S. Wire for Zippers. Carl E. Blass. *Wire and Wire Products,* v. 25, Sept. 1950, p. 725-726, 766-767.
Zipper "fastener chain" and "sliders" are made from wire in four basic alloys: nickel silver (65% Cu, 18% Ni, 17% Zn); rich-low brass (82-85% Cu); an Al-Mg alloy; and "Zamac" die-casting alloy. Exacting specifications with regard to chemical composition, microstructure, grain size, surface condition, etc. (S22, T10, Cu, Al, Zn)

392-S. Design Standards for Large-Diameter Steel Water Pipe. Walter H. Cates. *Journal, American Water Works Association,* v. 42, Sept. 1950, p. 860-886.
Includes tables, charts, and details of calculations. 43 ref. (S22, T4, CN)

393-S. Summarized Proceedings of Conference on "X-Rays in Industry"—Melbourne, Australia, November, 1949. R. G. Ackland, R. I. Garrod, and J. F. Richardson. *British Journal of Applied Physics,* v. 1, Sept. 1950, p. 217-224.
The 16 papers presented and their discussion are summarized; 9 were concerned with industrial radiography and associated photographic techniques, and the remainder with crystallographic applications. 25 ref. (S13, M23)

394-S. Inspecting Angular-Contact Bearings Under Pre-Load Conditions. F. C. Victory. *Machinery* (London), v. 77, Sept. 14, 1950, p. 304-306.
Gaging equipment used by Moore Special Tool Co., Bridgeport, Conn. All inspection procedure duplicates service conditions as nearly as possible, because of the change which often occurs on loading. (S14)

395-S. Ingot Heat Conservation; Some Methods of Calculating Internal Temperatures From Surface Temperatures of Ingots. *Journal of the Iron and Steel Institute,* v. 166, Sept. 1950, p. 71-76.
Calculation by use of the theoretical equation for a solid with known and constant thermal properties; by surface temperature measurements; and by an empirical equation using measured surface temperatures. (S16, C5, D9)

396-S. Simultaneous Polarographic Determination of Copper, Cadmium, Nickel, and Zinc in Bearing Metals. (In German.) Bernhard Rodewald. *Fresenius' Zeitschrift für analytische Chemie,* v. 131, No. 2, 1950, p. 81-88.
Method, equipment, and procedure. (S11, SG-c)

397-S. Nondestructive Testing of Welds (Status in 1949). (In German.) O. Vaupel. *Schweissen und Schneiden,* v. 2, June 1950, p. 147-154.
Equipment and procedures. (S13)

398-S. Recent Developments in the Nondestructive Testing of Materials by Electrical and Magnetic Methods. (In German.) Werner Jellinghaus. *Stahl und Eisen,* v. 70, June 22, 1950, p. 552-560; discussion, p. 560-561.

Previously abstracted from condensed version in *Engineers' Digest.* See item 358-S, 1950. (S13)

399-S. Advances in Non-Destructive Materials Testing by Means of Ultrasonics. (In German.) Otto Rüdiger. *Stahl und Eisen,* v. 70, June 22, 1950, p. 561-565; discussion, p. 565.

Diagrams the four elements (intensity, image, reflectoscope, and resonance) of the ultrasonic method. Use for detecting cracks, piping, and weld defects, measuring wall thicknesses, etc. 34 ref. (S13)

400-S. Inspection of Welds in Gas Pipe Lines by Means of Gamma Radiation From Radium. (In Russian.) R. B. Polyakova. *Avtogennoe Delo* (Welding), v. 21, July 1950, p. 18-19.

Method and apparatus developed for inspection under field conditions. (S13, CN)

401-S. Principles and Selection of Methods for Application of Emission Spectrochemical Analysis to Metallurgy. (In French.) R. Castro. *Revue de Métallurgie,* v. 47, July 1950, p. 521-527.

Principles and methods commonly used in spectral analysis. Technique of individual methods. Methods particularly applicable to metallurgy. (S11)

402-S. Instrumental Methods of Analysis Other Than Spectroscopy. (In French.) G. Charlot. *Revue de Métallurgie,* v. 47, July 1950, p. 528-530.

May be applied to metallurgy, such as spectrocolorimetry, polarography, amperometry, and potentiometry. The technique of operation of each. (S11)

403-S. The Use of Tannin in Chemical Analysis. L. L. Colin. *Journal of the Chemical, Metallurgical & Mining Society of South Africa,* v. 50, June 1950, p. 314-319.

Available information on the quantitative precipitation of Ta, Cb, and Ti. Methods for analysis of the tantalocolumbites; for separation of Ti from Fe, V, and U; for U in complex minerals; for Ti; and for V in roscoelite. Analytical "flowsheet". (S11, Ta, Cb, Ti, U, V)

404-S. The Thickness Measurement of Thin Films by Multiple Beam Interferometry. G. D. Scott, T. A. McLauchlan, and R. S. Sennett. *Journal of Applied Physics,* v. 21, Sept. 1950, p. 843-846.

Technique and its application to evaporated films of six different metals. It appears to be useful for all stable thin films up to several microns thick. (S15)

405-S. Processing Steel With Sound. Thomas A. Dickinson. *Steel Processing,* v. 36, Sept. 1950, p. 447-451.

Various applications of ultrasonics in steel processing. These include inspection, welding, smoke agglomeration, soldering, ultrasonic drilling, machining, pulverizing, etc. 32 ref.

(S general, K general, G general, ST)

406-S. Quality Control in Carbide Tools Manufacture. David F. Dickey. *Tool & Die Journal,* v. 16, Oct. 1950, p. 90, 94.

At Firth Sterling Steel & Carbide Corp. (S12, SG-j, C)

407-S. Why Machine Parts Fail. Part 6. Torsional Fractures. Charles Lipson. *Machine Design,* v. 22, Oct. 1950, p. 97-100.

Several examples of two main types of torsional fractures. Causes. Examples are of steel parts only. (S21, Q26, ST)

408-S. Tolerances for Investment Castings. T. F. Frangos. *Machine Design,* v. 22, Oct. 1950, p. 107-108.

Recommendations based on statistical distribution studies. Effects on costs. (S22, E15)

409-S. The Application of Radioactive Tracers to the Study of Metal-Solution Reactions. M. T. Simnad. *Journal of Metals,* v. 188, Oct. 1950, p. 1220.

Research in which radioactive Co, Cr, Ni, and Fe are being used in solutions into which are immersed numerous metals and alloys with various surface treatments. Effect of presence and absence of O_2 in the solutions and of oxide films on the metals, also influence of time, temperature and pH, are being studied. (S19, R2)

410-S. Sample at Random for Correct Statistical Control. Dorian Shainin. *Iron Age,* v. 166, Oct. 12, 1950, p. 172-176.

Recommended procedures. Points out pitfalls resulting from failure to select samples strictly at random. (S12)

411-S. A Thickness Gauge for Ceramic Coatings. Charles C. Gordon and Joseph C. Richmond. *Journal of the American Ceramic Society,* v. 33, Oct. 1, 1950, p. 295-300.

Previously abstracted from condensed version in *Finish.* See item 231-S, 1950. (S14, L27)

412-S. Alternative Designations for Stainless Casting Materials of Equivalent Chemical Compositions. N. S. Mott. *Product Engineering,* v. 21, Oct. 1950, p. 163.

A table. (S22, SS)

413-S. A Quantitative Colorimetric Method for Analyzing Binary Alloys.

(In German.) A. Boettcher and E. Hellwig. *Zeitschrift für anorganische und Allgemeine Chemie,* v. 263, Aug. 1950, p. 39-46.

Proposes a generally applicable method, demonstrated on Mg-Al alloys, and based on the fact that one component of the alloy affects the dye absorption of the other. (S11, Al, Mg)

414-S. The Use of Ultrasonics in Materials Testing. (In German.) Ludwig Bergmann. *Zeitschrift des Vereines-Deutscher Ingenieure,* v. 92, Sept. 1, 1950, p. 711-718.

Principles, methods, and apparatus for nondestructive testing using ultrasonic waves, for detection of internal defects and for measuring thickness. 25 ref. (S13, S14)

415-S. Nondestructive Method for Detecting and Determining Nickel in Brasses and Bronzes. (In Russian.) N. A. Tananaev and I. I. Kalinichenko. *Zhurnal Analiticheskoi Khimii* (Journal of Analytical Chemistry), v. 5, July-Aug. 1950, p. 228-233.

Special colorimetric method for nickel with separation of Cu by use of CdS powder. Applicability of the method to commercial specimens of low homogeneity is established. (S11, Cu)

416-S. Microscopic Method for Determination of Oxygen in Steel. (In Italian.) Giuseppe Ziliani. *Metallurgia Italiana,* v. 42, June 1950, p. 225-229.

Method is based on estimation of the inclusion areas and on analytical determination of sulfur content. (S11, ST)

417-S. Materials Data That Are Significant to the Designer. Charles Lipson. *Automotive Industries,* v. 103, Oct. 15, 1950, p. 38-41, 94, 96.

Trend toward testing of actual components under service conditions, since conventional tests on standard specimens of the material often give misleading or inadequate information. (S21)

418-S. Colorimetric Determination of Nickel in Brasses and Bronzes. W. L. Miller and George Norwitz. *American Foundryman,* v. 18, Oct. 1950, p. 67.

Rapid and accurate procedure. (S11, Cu)

419-S. Why Standardize Thicknesses of Thin Flat Metals. I. V. Williams. *Standardization,* v. 21, Oct. 1950, p. 260-261, 272.

ASA Standard B32.1: "Preferred Thicknesses for Thin Flat Metals Uncoated." Gives reasons in favor of universal adoption of the standard, as well as difficulties which have delayed its adoption. (S22)

420-S. Rapid Polarographic Determination of Zinc in Copper-Base Alloys. Milton Sherman. *Foundry,* v. 78, Nov. 1950, p. 94-95.

(S11, Zn, Cu)

421-S. The Camera—A Useful Foundry Tool. Benjamin Melnitsky. *Foundry,* v. 78, Nov. 1950, p. 108-113, 206, 208-210.

A wide variety of applications at Battelle Memorial Institute, National Bureau of Standards, Armour Research Foundation, and elsewhere. Includes highspeed photography of fluid flow, microfilming, metallography, electron microscopy, radiographic inspection, x-ray diffraction, and spectroscopic analysis. (S13, S11, M21, M22, M23, E general)

422-S. Polarographic Determination of Aluminum; Use of an Organic Reagent. Hobart H. Willard and John A. Dean. *Analytical Chemistry,* v. 22, Oct. 1950, p. 1264-1267.

New method is based on reduction of an aluminum di-o-hydroxyazo complex. It is sensitive to 0.005 mg. of Al per 50 ml., and is generally applicable to steels, nonferrous alloys, and minerals with an accuracy of ±3% after removal of interferences at a mercury cathode or by fusion with Na_2CO_3. 10 ref. (S11, Al)

423-S. Spectrophotometric Study of the Ruthenium-Thiourea Complex. Gilbert H. Ayres and Frederick Young. *Analytical Chemistry,* v. 22, Oct. 1950, p. 1277-1280.

Interference tests were made with solutions of Fe, Co, Ni, Cu, and Cr; of these, only Co and Cr gave appreciable interference. By the usual methods employed for separation of Ru and Os from all other metals and from each other, cation interference can be eliminated. Anions that might be introduced during the various separation methods do not interfere in the concentrations studied. 27 ref. (S11, Ru, EG-c)

424-S. Spectrophotometric Study of the Ruthenium—Dithio-oxamide Complex. Gilbert H. Ayres and Frederick Young. *Analytical Chemistry,* v. 22, Oct. 1950, p. 1281-1283.

Interference tolerances for other platinum metals, common cations which are colored and anions that might be present in certain separation procedures. Os is the only platinum metal that interferes extensively at 650 μm. (S11, Ru, EG-c)

425-S. Converting Platinum Resistance to Temperature. D. N. Eggenberger. *Analytical Chemistry,* v. 22, Oct. 1950, p. 1335.

Graphical method and its derivation. (S16)

426-S. Precision Thermostat for High Temperatures. William R. Eubank. *Review of Scientific Instruments,* v. 21, Oct. 1950, p. 845-851.

Suitable for control of temperatures of 1000-1550° C. Temperatures are readily maintained constant within ±0.1° C. for several hours, and within ±1.0° C. for several days. 12 ref. (S16)

427-S. The Determination of Thorium in High Grade and Low Grade Ores (Trace Elements Investigations—Report No. 44). F. S. Grimaldi and Charlotte A. Marsh. *U. S. Atomic Energy Commission,* AECD-2818, Sept. 1947, 9 pages.

Determination in monazite ores, which is successful for ores down to 0.04% ThO_2. Th is separated from Ca, Mg, and most rare earths by double precipitation with ammonia; from Zr, Ti, and Cb by precipitation as fluoride; and from remaining rare earths by peroxynitrate precipitations. Conditions were found that successfully overcome interferences. (S11, Th)

428-S. The Determination of Thorium in Low-Grade Ores. Brenton H. Dickson and David Kaufman. *U. S. Atomic Energy Commission,* AECD-2887, Mar. 10, 1950, 21 pages.

Modifications of methods by Grimaldi, Rodden, and their respective co-workers for application to California black sands. 12 ref. (S11, Th)

429-S. Investigation of Quality of Concrete Reinforcing Steel. *U. S. Bureau of Reclamation, Research and Geology Division,* Materials Laboratories Report No. M-73, 1949, 15 pages.

ASTM specifications and building code recommendations. Strength and hardness tests. (S22, Q23, Q29, CN)

430-S. The Use of Platinum Thermocouples in Vacuo at High Temperatures. A. G. Metcalfe. *British Journal of Applied Physics,* v. 1, Oct. 1950, p. 256-258.

During thermal analysis on Co-base alloys in vacuum with Pt-Pt + 13% Rh thermocouples it was found that the e.m.f. developed at any temperature gradually falls. The principal cause of this is believed to be the transfer of Rh to the Pt wire via the vapor phase. It is shown that this effect can be reduced considerably by use of a platinum + 1% Rh wire in place of the Pt wire. (S16, SG-a, Pt)

431-S. Control of Microstructure of a Heat Resistant Alloy for Turbo Reactor Blades. (In French.) P. A. Jacquet. *Revue de Métallurgie,* v. 47, Aug. 1950, p. 568-572.

Method of defect detection applied to "Nimonic" alloy: 20% Cu; 72% Ni; balance Fe, Ti, and Al. This method consists in preliminary electropolishing. Details of solutions and procedure. (S13, M27, Ni, SG-h)

432-S. Automatic Devices Reduce Inspection Costs. Joseph Geschelin. *Automotive Industries,* v. 103, Nov. 1, 1950, p. 32-33, 64, 66.

Automatic electric, electronic, and air-actuated inspection devices are being applied wherever possible at Ford Motor Co. to reduce inspection cost and improve quality. Several examples recently developed, particularly for gaging. (S14)

433-S. Sodium Content in Aluminum Speedily Analyzed. D. A. Brewster and C. J. Clausen, Jr. *Iron Age,* v. 166, Nov. 2, 1950, p. 88-92.

Rapid and accurate photometric method. Light intensities of atomized solutions are measured with a Beckman spectrophotometer. Accuracies are higher than with conventional procedures. Analyses can be completed in 30 min. (S11, Al)

434-S. For Successful Production Welding Know Your Metals. Jay Bland. *Industry & Welding,* v. 23, Oct. 1950, p. 38-39, 41, 74-75; Nov. 1950, p. 24, 66.

First two articles of series on spark-test identification. (To be continued.) (S10, K general)

435-S. Thermal Cracks in Turbine and Generator Rotor Forgings. *Mechanical Engineering,* v. 72, Nov. 1950, p. 919-921.

Separate comments by J. T. Jarman, J. W. Price, Jr., A. O. Schaefer, J. C. Smack, and H. A. Wagner on above paper by A. W. Rankin, C. J. Boyle, C. D. Moriarty, and B. R. Seguin (July issue; see item 289-S, 1950). Includes authors' replies. (S13, T25)

436-S. Temperature and Intensifying Screen Effects in Radiography With Cobalt-60. A. Morrison and K. J. Parry. *Non-Destructive Testing,* v. 9, Summer 1950, p. 9-10.

Effect of temperature on film density, optimum front lead-screen thickness, and sensitivities obtainable with lead-foil screens and with commercial fluorescent screens. (S13)

437-S. Xeroradiography — A Basic Developument in X-Ray Nondestructive Testing. Robert C. McMaster and Roland M. Schaffert. *Non-Destructive Testing,* v. 9, Summer 1950, p. 11, 22.

New rapid, low-cost, all-electric method of obtaining permanent X-ray images does away with film and chemical processing. Contrast sensitivity is better than the 2% required for inspection of aircraft parts. The process possesses an unusual local

contrast sensitivity which reveals small discontinuities clearly. Definition exceeds 200 lines to the inch. Speed exceeds that of most non-screen X-ray films. (S13)

438-S. Mottling of Fine Grained X-Ray Films. H. E. Stauss, F. W. Vonbatchelder, and W. C. Sadler. *Non-Destructive Testing,* v. 9, Summer 1950, p. 12-14.

Mottling was observed when Type M film was substituted for Type K. Tin was found on the surfaces of the lead sheets at fault, and probably was responsible for the mottling. Although no corrosion products could be detected by X-ray analysis, investigation was made of the influence of thin films of corrosion products because of the possibility that some might be fluorescent. Lead sulfate was found to be fluorescent. However, it was concluded that thin films of corrosion products, either fluorescent or non-fluorescent reduce intensification by absorption of photoelectrons. (S13, R2)

439-S. Noncontacting Thickness Gauge Using Beta Rays. C. W. Clapp and S. Bernstein. *Transactions of the American Institute of Electrical Engineers,* v. 69, 1950, p. 488-490.

Previously abstracted from *General Electric Review.* See item 138-S, 1950. (S14, A1)

440-S. Flight and Ground Loads on Light Plane Wing Fittings. Given A. Brewer. *Proceedings of the Society for Experimental Stress Analysis,* v. 8, no. 1, 1950, p. 93-102.

Analysis of the failure in flight of the rear wing fitting on a popular, small, light plane. Results of flight tests are plotted. (S21, T24)

441-S. Dye-Penetrant Inspection. James Joseph. *Welding Engineer,* v. 35, Nov. 1950, p. 38-39. (S13)

442-S. An Interferometric Method for Accurate Thickness Measurements of Thin Evaporated Films. L. G. Schulz. *Journal of the Optical Society of America,* v. 40, Oct. 1950, p. 690-692.

Method is evaluated by comparison with other methods and in terms of its applications and limitations. (S15)

443-S. Ultrasonic Rail Testing on the New York Central. C. B. Bronson. *Railway Engineering and Maintenance,* v. 46, Nov. 1950, p. 1025-1027.

Equipment and procedures. (S13, T23)

444-S. Why Machine Parts Fail. Part 7. Failures Originating on the Drawing Board. Charles Lipson. *Machine Design,* v. 22, Nov. 1950, p. 158-162.

Failures caused by improper design. Poor design of keyways, splines, fillets, oil holes, threads, gear teeth, poor press and shrink fits, overstress, and combined effects. Graphs and tables show stress concentration factors. (S21, Q25)

445-S. Determination of Impurities in Electroplating Solutions. XX. Traces of Chromium in Zinc Plating Baths. Earl J. Serfass and Mary H. Perry. *Plating,* v. 37, Oct. 1950, p. 1057-1059.

Development of a rapid, accurate method for determination of a very small amount of chromate ion in Zn plating baths which also may contain Cu, Co, Ni, Fe^{+++}, and Pb as impurities. The method involves measurement of transmittancy of a solution and determination of amount of Cr from a curve. 12 ref. (S11, L17, Zn, Cr)

446-S. The Determination of Trivalent Chromium in Chromic Acid Plating Baths. Fielding Ogburn. *Plating,* v. 37, Nov. 1950, p. 1153-1155.

Existing methods are said to be inaccurate, slow and tedious, or require potentiometric equipment. The new method does not suffer from these drawbacks. It involves precipitation by NaF, solution in H_2SO_4, and two titrations. (S11, L17, Cr)

447-S. Progress in Ultrasonic Methods of Materials Testing. O. Rudiger. *Engineers' Digest,* v. 11, Oct. 1950, p. 352-354. Translated and condensed.

Previously abstracted from *Stahl und Eisen.* See item 399-S, 1950. (S13)

448-S. The Breaking of Valve Springs. P. Kohn. *Engineers' Digest,* v. 11, Oct. 1950, p. 358-361. Translated and condensed from *Strojnicky Obzor,* v. 30, May 1950, p. 65-70.

Causes and means for prevention of breakage. The influence of fluctuations in rotation of the camshaft on the oscillation of valve springs, which in many cases is likely to be the cause of apparently inexplicable spring breakages. Alloys used are not discussed. (S21, T7)

449-S. The Choice of Metals. N. B. Brown. *Canadian Metals,* v. 13, Oct. 1950, p. 10-12, 44, 46.

Properties of ferrous metals in terms of their suitability for specific industrial uses. Importance of considering factors of cost and manufacturing methods as well as metal specifications themselves. (S22, T general, ST)

450-S. Reports on Miscellaneous Metallurgical Investigations. H. H. Symonds. *Journal of the Birmingham Metallurgical Society,* v. 30, Sept. 1950, p. 92-116.

Failure of brass nuts from the filling heads of an aerated water

machine. Investigation into the premature failure of welt needles. Cracking of lipstick holder caps. Surface imperfections on brass trays. (S21, Cu, CN)

451-S. The Accurate Determination of Carbon in Low-Carbon Steels. J. E. Wells. *Journal of the Iron and Steel Institute,* v. 166, Oct. 1950, p. 113-117.

The method is based on the use of a liquid-oxygen trap for isolation of CO_2 produced by burning the steel in O_2. The quantity of CO_2 formed is subsequently estimated by measuring the pressure exerted when it is confined to a known volume. The apparatus gives reproducible results of at least the same order of accuracy as those obtained by other low-pressure methods, and has the merit of simplicity. (S11, ST)

452-S. Rapid Estimation of Phosphorus in Steels. A. Hans. *Journal of the Iron and Steel Institute,* v. 166, Oct. 1950, p. 118-122.

The methods of Hanau and Wolfe and of Hasler and Barley for spectrographic analysis of steel; results of a number of comparative experiments. The Geiger-Muller counter and the electron-multiplier tube and their respective values for use in estimation of phosphorus. (S11, ST)

453-S. Continuous Temperature Measurement of Liquid Steel in the Furnace. D. Hardwick and H. Everard. *Journal of the Iron and Steel Institute,* v. 166, Oct. 1950, p. 147-148.

Continuous records of temperature of steel in a side-blown converter were obtained throughout the blowing operation by fitting a Pt/Pt-Rh thermocouple with a specially designed protective sheath into the refractory wall during lining of the vessel. Results indicate that this arrangement could be of general use for steel melting research and possibly for production control. (S16, D3, ST)

454-S. Measuring of Small and Smallest Holes; Two New Measuring Methods. (Concluded.) Rudolf Lehmann. *Microtecnic,* v. 4, May-June 1950, p. 120-129. (Translated from the original text in German.)

A critical survey of internal gaging instruments reveals that they possess certain disadvantages when small or very small holes are measured. Two new measuring instruments, based on a mechanical-optical principle, are now being built by a German firm. The measuring range of one is between 0.5 and 50 mm. and of the other between 0.05 and 8 mm. Error is $\pm 1\mu$. (S14)

455-S. Applications of the Electronic Tubes to the Measurements of Temperature. Jean Schwartz. *Microtecnic,* v. 4, May-June 1950, p. 159-164; July-Aug. 1950, p. 209-216. (Translated from the French.)

A comprehensive review. Part 1: Introduction, purposes in general, and use of thermosensitive elements and resistance thermometers. Part 2: Thermocouples, optical pyrometers, photo-electric pyrometers, and indicating and recording instruments. (To be continued.) (S16)

456-S. Methods of Measurement and Definition of Surfaces. H. Becker. *Microtecnic* (English Ed.), v. 4, July-Aug. 1950, p. 180-184. (Translated from the German.)

Various optical instruments. Schematic diagrams show principles of action. (To be continued.) (S15)

457-S. Surface Testing and Its Standardization. (In German.) H. Becker. *Metall,* v. 4, Sept. 1950, p. 359-365. The "feeler" method of determining and recording surface roughness. German and foreign instruments and problems of standardizing surface conditions. (S15)

458-S. Dye Penetrant Quickly Reveals Surface Flaws. Alexander Gilbert. *Iron Age,* v. 166, Nov. 16, 1950, p. 91-92.

New inspection technique. (S13)

459-S. Permanent Record of Magnaflux Indications. Harold H. Lurie. *Metal Progress,* v. 58, Nov. 1950, p. 736.

Quick way of preparing the sample so a Scotch-tape print can be made in a few minutes, by using a 1½% (by volume) suspension of the black paste in CCl_4. (S13)

460-S. Thermocouple Junctions Are Improved by Arc Welding in Inert Atmosphere. A. J. Francescan and E. A. Nitz. *Petroleum Processing,* v. 5, Nov. 1950, p. 1205-1206.

Improved technique. (S16, K1)

461-S. Beam Profiles With Parallel Flanges. (In French.) J. Courthéoux. *Revue de Métallurgie,* v. 47, Sept. 1950, p. 669-677.

New standard profiles for "H" ("I"), "T", and "U" beams. Methods of production and fields of application. European and American standards are comparatively tabulated. (S22, F23, CN)

462-S. Control of Surface Condition by a Fluorescence Inspection Technique. (In French.) Maurice Deribere. *Revue de Métallurgie,* v. 47, Sept. 1950, p. 704-705; discussion, p. 705.

A short review, indicating a series of fluorescent agents and their composition. (S15)

463-S. Two Nomograms for Use When Measuring With Optical Pyrometer. (In German.) J. Euler and

R. Ludwig. *Zeitschrift für angewandte Physik*, v. 2, Sept. 15, 1950, p. 362-366.

Nomograms presented permit conversion of black-body temperature into true temperature provided absorptivity is known. Color temperature may be stated from two black-body temperature readings at different wave lengths. Mathematical principles. 14 ref. (S16)

464-S. (Book) **Principles and Practice of Spectrochemical Analysis.** Norman H. Nachtrieb. 324 pages. 1950. McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y.

Describes theory and use of the instruments of emission spectroscopy and theory of analytical spectroscopy. Application of spectrographic methods to solutions, metals, and nonconducting solids. The roles of electrolysis, solvent extraction, organic complexing reagents, carrier precipitations, and manipulative operations of trace analysis. (S11)

465-S. (Book) **Industrial Instrumentation.** Donald P. Eckman. 396 pages. 1950. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y.

Reviews the principles of measuring methods employed in industrial processing. Emphasizes the method rather than the mechanism. Mechanical, chemical, and electrical applications. Includes temperature-measurement methods and apparatus, methods for composition analysis, also problems with each chapter. Footnote references. (S general)

466-S. (Book) **Atlas der Restlinien. Bd. I. Spektren von 30 chemischen Elementen. Ed. 2. Bd. II. Spektren der seltenen Erden. Ed. 1. Bd. III. Spektren seltener Metalle und einiger Metalloide. Ed. 1.** (Atlas of Persistent Spectral Lines. Vol. I. Spectra of 30 Chemical Elements. Vol. II. Spectra of the Rare Earths. Vol. III. Spectra of the Rare Earths and Some Semimetallic Elements.) Alois Gatterer and Joseph Junkes. 53, 350, and 80 pages. 1947, 1945, and 1949. Specola Vaticana, Vatican City, Italy. $15.00, $45.00, and $25.00.

Vol. I contains charts and tables of prismatic arc and spark spectra of Ag, Al, As, Au, B, Ba, Bi, C, Ca, Cd, Co, Cr, Cu, Mg, Mn, Mo, Ni, P, Pb, Pt, Rb, Sb, Si, Sn, Sr, Ti, Tl, V, W, and Zn. Vol. II covers 18 rare-earth elements. Vol. III covers Au, As, Be, Ga, Ge, Hf, In, Ir, Nb, Os, Pd, Pt, Re, Rh, Ru, Sb, Ta, Te, and U (arc and spark spectra from 2100 to 6340 A); and high-frequency excitation spectra (2340-6430 A) of Cl, Br, I, S, Se, and Hg. The spectral charts are photographic negatives. Each spectrum is shown in triplicate with weak, medium and strong exposures, each accompanied by an iron-arc spectrum, by an engraved scale of wavelengths, and by engraved wavelengths of the principal lines. (S11)

467-S. Thickness Gaging by Radiation Absorption Methods. C. W. Clapp and S. Bernstein. *General Electric Review*, v. 53, Nov. 1950, p. 39-42.

Design techniques applied to gages which measure thickness by radiations of X-rays, beta rays, or gamma rays. (S14)

468-S. Spectrochemical Determination of Iron, Magnesium, and Manganese in Titanium Metal. Maurice J. Peterson. *Analytical Chemistry*, v. 22, Nov. 1950, p. 1398-1400.

An H_2SO_4 solution of the metal is placed in a porous-cup electrode, and excitation is by means of a controlled Multisource unit. Average deviations are approximately ± 8% for Fe and Mn in the ranges 0.08-0.5% and 0.02-0.2%, respectively. Average deviation for Mg is ± 6% in the range 0.05-0.7%. 11 ref. (S11, Fe, Mn, Mg, Ti)

469-S. Iridium in Perchloric, Phosphoric, and Nitric Acid Mixtures; A Spectrophotometric Study. Gilbert H. Ayres and Quentin Quick. *Analytical Chemistry*, v. 22, Nov. 1950, p. 1403-1408.

Development of a spectrophotometric method for determination of Ir. 26 ref. (S11, Ir)

470-S. Polarographic Determination of Cobalt as Trioxalatocobaltate (III). I. M. Kolthoff and James I. Watters. *Analytical Chemistry*, v. 22, Nov. 1950, p. 1422-1426.

New method for determination of Co in the presence of a large excess of Ni, Cu, and Fe, as well as most other elements. 11 ref. (S11, Co)

471-S. Potentiometric, Amperometric, and Polarographic Methods for Microanalysis. Thomas D. Parks and Louis Lykken. *Analytical Chemistry*, v. 22, Nov. 1950, p. 1444-1446.

Various practical methods for the microdetermination of common constituents in petroleum products by the above. Includes methods for Ag, Pb, Fe, and Cu by amperometric titration; and Pb, Al, and Na by polarographic analysis. 31 ref. (S11)

472-S. Metal Composition Tests for the Steel Melter. H. H. Fairfield, H. F. Graham, and A. E. McMeekin. *Canadian Metals*, v. 13, Nov. 1950, p. 18, 20-21, 40-41.

Previously abstracted from *American Foundrymen's Society*, Preprint No. 50-30, 1950. See item 208-S, 1950. (S11, CN)

473-S. Multiple-Beam Interferometry. S. Tolansky. *Endeavour,* v. 9, Oct. 1950, p. 196-202.

See "Interferometric Study of Metal Surfaces; Application of the Multiple-Beam Technique," *Metal Treatment and Drop Forging,* item 106-S, 1950. (S15)

474-S. Infrared Photography. A Contribution to Industrial Heat-Measuring Techniques. (In German.) Gerhard Naeser and Werner Pepperhoff. *Archiv für das Eisenhüttenwesen,* v. 21, Sept.-Oct. 1950, p. 293-295.

Several photographic methods for measuring temperature. A simple process is based on the fact that certain substances change their colors at specific temperatures. Several examples illustrate the industrial applicability of the process. 14 ref. (S16)

475-S. Nondestructive Materials Testing on Pipe Lines; X-Ray Examination of Welded Pipe Joints. (In German.) Wolfgang Kolb. *Gas-und Wasserfach,* v. 91, Oct. 31, 1950, p. 247-255.

Potentiometric, electromagnetic, and counting-tube methods for measuring the thicknesses of tube walls. The magnetic-powder process for measuring the thicknesses of protective coatings; how specific welded-joint defects can be detected by the X-ray method. 17 ref. (S14, S13)

476-S. Better Ways of Identifying Your Product. Edwin Drewitz. *Product Engineering,* v. 21, Dec. 1950, p. 117-124.

Contemporary methods and processes for better product identification. Among the methods and materials are three-dimensional plastics; decalcomanias; die castings; stamped and etched forms; plastic moldings; integral sand castings, lithographed stampings; embossed sheet metal; multiple-colored metals; quality forgings; porcelain-enameled members; skeleton forms; electroplated stampings; and castings. Types of finishes. (S10, L general)

477-S. Know Your Drill Collar. Trebor B. Morris. *World Oil,* v. 131, Dec. 1950, p. 106-108, 112, 114.

Material and treatment factors which may seriously affect the service performance of drill collars. Relationship between suggested cause and collar performance. Major causes of failure are cracks at joint connections, excessive nonmetallic inclusions in threaded areas; stresses due to nonuniformity of structure; and Brinell hardness outside the optimum range. (S21, T28, AY)

478-S. Surface Casing Failures. B. B. Smith. *World Oil,* v. 131, Dec. 1950, p. 129-130.

Possible causes of failure in surface strings, and preventive measures. (S21, T28, ST)

479-S. X-Ray Examination of Small Parts. *Journal of Metals,* v. 188, Dec. 1950, p. 1443.

Recent experiments of Sam Tour & Co., Inc., indicate that minute parts can be successfully examined by X-ray methods. Example of a very thin stainless steel tube that had fractured in use. (S13)

480-S. Quantitative Spectrographic Analysis of Zirconium-Hafnium Mixtures. Velmer A. Fassèl and Charles H. Anderson. *Journal of the Optical Society of America,* v. 40, Nov. 1950, p. 742-747.

Method covering the Hf-Zr concentration-ratio range from 0.001 to 100. Precision determinations showed a standard deviation of 1.5-2.0%. 32 ref. (S11, Zr, Hf)

481-S. Simultaneous Recording of Two Wave-Length Ranges With the Littrow Spectrograph. Robert W. Murphy and Harold K. Hughes. *Journal of the Optical Society of America,* v. 40, Nov. 1950, p. 779-781.

Part of a program designed to reduce the size of samples and to improve the efficiency of spectroscopic analyses. Two wave-length ranges are recorded from a single exposure by use of an auxiliary-mirror system. Elimination of an extra exposure results in substantial reductions in analytical time and in required size of samples. (S11)

482-S. Why Standardize Thicknesses of Thin Flat Metals? I. V. Williams. *Tool & Die Journal,* v. 16, Dec. 1950, p. 58, 60, 69.

Arguments in favor of standardization. (S22)

483-S. Automatic Sorting Speeds Piston and Wristpin Production. *Steel,* v. 127, Dec. 11, 1950, p. 91-92.

Refrigerator compressor parts are gaged electronically by a fast classifier that eliminates manual methods entirely. This device has reduced rejects 35% at Westinghouse's East Springfield, Mass., plant. (S14, T7)

484-S. Here's How Quality Control Pays Off in the Aircraft Industry. Gilbert C. Close. *Industry & Welding,* v. 23, Nov. 1950, p. 36-38, 40-42; Dec. 1950, p. 30-31, 70-71.

Application to various examples of welded construction. (S12, Kg)

485-S. Cobalt-60 Used for Weld Inspection. W. L. Schwinn. *Welding Engineer,* v. 35, Dec. 1950, p. 24-28. Condensed from paper published in "Symposium on the Role of Non-Destructive Testing in the Economics of Production", American Society for Testing Materials, Philadelphia.

Results of extensive study made by Babcock & Wilcox Co. to determine comparative costs and results of X-radiography, radium radiography, and Co-60 radiography for inspection of steel weldments. The latter is much cheaper than radium. While more expensive than X-radiography, use of Co-60 provides more satisfactory results for certain types of work. (S13)

486-S. A New Technique for Inspecting Metals. Gilbert C. Close. *Finish,* v. 7, Dec. 1950, p. 19-21, 48.

Dye-penetrant technique developed by Turbodyne Corp. It can be used on the production line or in the field. (S13)

487-S. Instrumentation and Automatic Control in the Steel Industry. A. Linford. *Machinery Lloyd* (Overseas Edition), v. 22, Nov. 11, 1950, p. 68-71, 73, 75, 77.

(S16, ST)

488-S. Testing the Metal or Testing the Casting. Some Notes on the New Swedish Grey-Iron Specification. Erik O. Lissell. *Foundry Trade Journal,* v. 89, Nov. 9, 1950, p. 357-364; Nov. 16, 1950, p. 391-397.

Previously abstracted from *Institute of British Foundrymen,* Paper No. 976, 1950. See item 568-Q. (S22, Q general, CI)

489-S. Metallurgical Applications of Ultra-Violet Light. A. G. Deeming. *British Cast Iron Research Association Journal of Research and Development,* v. 3, Oct. 1950, p. 533-537; discussion, p. 537-538.

Applications to analysis, testing, and inspection of metals. 15 ref. (S general)

490-S. Measurement of Thickness of Nonmagnetic Coatings. (In Russian.) L. F. Kulikovskii and A. M. Melik-Shakhnazarov. *Elektrichestvo* (Electricity), Aug. 1950, p. 67-70.

Apparatus for direct measurement of thickness of nonmagnetic coatings on magnetic bases. Includes theoretical explanation of the mechanism of the device. (S14)

491-S. Detection of Soil Removal in Metal Cleaning by the Radioactive Tracer Technique. J. C. Harris, R. E. Kamp, and W. H. Yanko. *Journal of the Electrochemical Society,* v. 97, Dec. 1950, p. 430-432.

Tracer technique was used to define apparent limits of sensitivity of the water-break, fluorescent-dye, and copper-plate methods of soil detection. Quantitative estimates of limits of sensitivity are given. (S15, S19, L12)

492-S. An X-Ray Method for Determining Tin Coating Thickness on Steel. *Journal of the Electrochemical Society,* v. 97, Dec. 1950, p. 472-474.

Discussion of above paper by H. F. Beeghly. See item 153-S, 1950. (S14, L17, Sn, ST)

493-S. Improved Radioactive-Tracer Carrier for Metal Cleaning Studies. J. C. Harris, R. E. Kamp, and W. H. Yanko. *ASTM Bulletin,* Dec. 1950, p. 82-83.

Previously abstracted under similar title from *Journal of the Electrochemical Society.* See item 491-S. (S15, S19, L12)

494-S. A Blueprint for Quality Control of Raw Materials. Harry D. Greenwood. *Western Metals,* v. 8, Nov. 1950, p. 19-20.

First of a series. Quality control of raw materials up to the point of inclusion in the manufactured product. (S12)

495-S. Why Machine Parts Fail. (Concluded.) **Part 8. When Not to Blame the Designer.** Charles Lipson. *Machine Design,* v. 22, Dec. 1950, p. 151-156.

Failures caused by defective metallurgy, improper methods of fabrication and assembly, and other factors usually beyond direct control of the designer. 10 ref. (S21, ST)

496-S. (Book) Quality Control and Statistical Methods. Edward M. Schrock. 213 pages. 1950. Reinhold Publishing Corp., 330 W. 42nd St., New York 18, N. Y. $5.00.

Presents in elementary form many of the widely successful procedures developed and tested over the past 25 years by statistical quality control engineers Although it is a good summary of successful experience in quality control, the book is by no means even an introduction to statistical reasoning, or to the logic behind the procedures recommended. The chapters on significance tests and on least squares are marred by errors of fact and judgment. (From review in *Chemical and Engineering News.)* (S12)

SECTION T

APPLICATIONS of METALS in EQUIPMENT and INDUSTRY

1T. Textile Machinery and Accessories. *Light Metals,* v. 12, Dec. 1949, p. 655-664.

Applications of Al and Mg shown at the recent exhibition in England. (T29, Al, Mg)

2T. Light-Alloy Bearings in Germany. *Light Metals,* v. 12, Dec. 1949, p. 664-667.

Diagrams and tables give dimensional details of automotive crankshaft and connecting-rod bearings. Al alloy compositions are given. (T7, Al)

3T. A Modern Aluminium-Framed Glasshouse. F. J. Dean. *Light Metals,* v. 12, Dec. 1949, p. 668-673.

Practical and economic advantages of light-alloy construction. (T26, Al)

4T. Awheel at Earls Court. *Light Metals,* v. 12, Dec. 1949, p. 676-680.

Various applications of Al demonstrated at recent British "Motorcycle and Cycle Exhibition". (T10, Al)

5T. Duralumin H Shuttering and the Wimpey "Situfoam" Construction System. *Light Metals,* v. 22, Dec. 1949, p. 681-685.

Foamed-concrete housing construction in which Al alloy forms play an important role. (T26, Al)

6T. The Bitumetal Roof. *Light Metals,* v. 12, Dec. 1949, p. 686-689.

Roofing system based on corrugated Al sheet and bituminous covering. (T26, Al)

7T. At the Dairy Show. *Light Metals,* v. 12, Dec. 1949, p. 690-694.

Applications of Al and alloys exhibited at British show. (T3, Al)

8T. Comparative Tests of Aluminum and Galvanized Ducts. *Sheet Metal Worker,* v. 41, Dec. 1949, p. 48.

Four different types of hot-air ducts were tested for insulating properties: bare aluminum; bare galvanized iron; galvanized iron covered with asbestos paper; and galvanized iron covered with ¼-in. Asbestocel insulation. Additional tests were made after painting the bare galvanized-iron duct with aluminum, and after wrapping the asbestos-paper-covered duct with aluminum foil. Results indicate superiority of bare aluminum for new installations and of Al foil wrapping to improve efficiency of galvanized-iron ducts. (T27, Al, Zn)

9T. Light Strong Rail Steel Finds Increasing Acceptance by Western Manufacturers. *Western Metals,* v. 7, Dec. 1949, p. 28-29.

Varied uses. Having approximately 50% greater strength than mild steel, rail steel provides an opportunity to use lighter sections and gages without sacrificing strength; stiffness, and resiliency. (T23, ST)

10T. Washer Leadership. *Modern Metals,* v. 5, Dec. 1949, p. 16-23.

Procedures and equipment used in production of Maytag washers, in which aluminum plays a major role. Foundry practice plus secondary working operations are emphasized. (T10, Al)

11T. Grain Storage Bins: Year's Biggest New Use for Aluminum. *Modern Metals,* v. 5, Dec. 1949, p. 26-27. (T3, Al)

12T. Big Business. Aluminum Storm Windows. *Modern Metals,* v. 5, Dec. 1949, p. 30-32.

Fabrication procedures. Extrusion, aging, machining, and assembly are the principal processes. (T26, Al)

13T. Sewaren Welded Aluminum Bus Proves Practicable and Economical. D. M. Quick. *Electric Light and Power,* v. 27, Dec. 1949, p. 58-63.

Large-scale application of welded

aluminum bus for 13 and 132-kv. service in outdoor transformer yard, which resulted from comparative cost studies, supplemented by exhaustive tests. (T1, Al)

14T. Aluminum Alloys for the Storage and Transportation of Chemicals. E. D. Verink, Jr. *Corrosion* (News Section), v. 6, Jan. 1950, p. 1.

Typical applications to large tanks, tank cars, and hopper cars. (T29, Al)

15T. Solid-Type Journal Bearings in High-Speed Freight Service. E. S. Pearce, R. J. Shoemaker, and I. E. Cox. *Transactions of the American Society of Mechanical Engineers,* v. 72, Jan. 1950, p. 1-8; discussion, p. 8.

Operating conditions involved in the selection of the bearing equipment used in high-speed freight service. Advantages of the solid type. Specific information on sleeves and bearings of the National Bearing Div., American Brake Shoe Co., and of Magnus Metal Corp. Mechanical properties of "Satco" (97-98% Pb) bearing metal. (T7, SG-c)

16T. Tests of Aluminum and Steel Railway Bridge Girders. E. C. Hartman, R. L. Moore, and F. E. Rebhun. *American Railway Engineering Association, Bulletin,* v. 51, Dec. 1949, p. 290-306.

Completion in 1946 of an all-aluminum plate girder span demonstrated that design and fabrication of such a structure was well within the scope of current engineering practice. Tests made after one year's service show that the behavior of the aluminum girders was in good agreement generally with that computed and that the action was as determinate as that of the steel girders of the same bridge. Tests were limited to an investigation of stresses and deflections under a single 228-ton steam locomotive. (T26, Q25, Al)

17T. Carbide in Gage Manufacture. F. Steele Blackall, III. *Tool & Die Journal,* v. 15, Jan. 1950, p. 64.

Unusual use for carbides. (T8, SG-j)

18T. Types of Carbide Cutting Tools and Their Specific Applications. W. L. Kennicott. *Tool & Die Journal,* v. 15, Jan. 1950, p. 76-78, 103. (T6, SG-j)

19T. Design of a High-Temperature Resistance Furnace. F. H. McRitchie and N. N. Ault. *Journal of the American Ceramic Society,* v. 33, Jan. 1, 1950, p. 25-26.

Furnace capable of operating up to 3770° F. in vacuum or in hydrogen or rare-gas atmospheres. Problems of outgassing and atmosphere contamination by furnace materials are largely circumvented by eliminating insulation. (T5)

20T. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 42, Jan. 1950, p. 67A-68A.

Some recent developments in nodular cast iron as well as in fluorinated polymers for construction of corrosion resistant chemical equipment. (T29, R general, CI)

21T. How Gage Blocks Are Made. Ray Gierlich. *American Machinist,* v. 94, Jan. 9, 1950, p. 85-89.

Equipment and procedures. (T8)

22T. Steels for Hobbing. L. Sanderson. *British Plastics,* v. 21, Dec. 1949, p. 673-675.

Selection of steels for hobbing, especially as used in the production of plastic molds. (T5, G16)

23T. Some Experimental Studies of Furnace Aerodynamics in the Iron and Steel Industry. M. P. Newby and R. D. Collins. "Proceedings of the Seventh International Congress for Applied Mechanics", v. 2, 1948, p. 164-176.

Problems of wear, power consumption, and mixing of two or more fluid streams. 12 ref. (T5, D general)

24T. Electric Furnace With "Kryptol" Resistors. (In French.) Jean Bernot. *Journal du Four Electrique et des Industries Electrochimiques,* v. 58, Sept.-Oct. 1949, p. 111-113.

Furnace improved by addition of an automatic temperature regulating device. "Kryptol" is a form of carbon. It was introduced as a resistance material many years ago. Superiority over other materials is claimed. Various applications. (T5)

25T. Contribution to the Study of Variable Conditions in Furnaces. Heating a Vacuum Furnace of Constant Capacity. Experimental Study on a Semi-Industrial Scale. (In French.) V. Broida and Ch. Henry. *Chaleur & Industrie,* v. 30, Sept. 1949, p. 207-223; Oct. 1949, p. 239-248.

Experimental apparatus and procedure. A formula is derived for determination of one of three variables (temperature, time and calorific output), when two are known. Method of graphic interpretation. Theoretical basis of the method, applications, and conclusions. (T5)

26T. Sintered Bearings Instead of Ball and Friction Bearings, and Electroplated Bearings Instead of Cast Bearings—Two Production Problems. (In German.) W. Katz. *Metall,* v. 3, Sept. 1949, p. 295-296.

Recommends use of sintered bearings and bearings produced by electrodeposition for economic reasons. Properties of such bearings. (T7)

27T. Experiences With Bearing Materials on the German National Railways. (In German.) V. Schneider. *Metall,* v. 3, Oct. 1949, p. 327-330.

Experience with alloys of lead, zinc, and copper; cast iron and malleable cast iron; sintered iron (other sintered materials were not investigated); and synthetic resins. (T23, SG-c)

28T. Importance of Design to Tanks and Pressure Vessels. Walter Aamans. *Welding Journal,* v. 29, Jan. 1950, p. 7-16; discussion, p. 16-18.

Aims to show that sound engineering design cannot be assured solely by applying the formulas given in the Unfired Pressure Vessel Code. Need for more research. Considers specific types of components in detail. The nature of steel fracture; mechanical prospects vs. service needs; shape vs. stress distribution, etc. 12 ref. (T26, Q general)

29T. Balanced Production. *Die Castings,* v. 8, Jan. 1950, p. 21-22, 53.

In the production of the Ohaus triple-beam laboratory balance, Zn-alloy die castings have replaced conventional cast-iron and brass parts in order to give a highly standardized unit. (T8, Zn)

30T. Uniform Parts Assure Rapid Production. *Die Castings,* v. 8, Jan. 1950, p. 23-24.

Use of die-cast Zn and Al for basic parts of food mixers produced by Dormeyer Corp. (T10, Zn, Al)

31T. Taxi Meter Parts: Housing; Internal Framework; Functioning Parts. *Die Castings,* v. 8, Jan. 1950, p. 26-27, 53-55.

Use of Zn-alloy die castings. (T8, Zn)

32T. Redesign From Wood to Die Castings. *Die Castings,* v. 8, Jan. 1950, p. 28-30, 55-57.

Redesign of Executone intercommunication-system units to Zn-alloy die castings. (T8, Zn)

33T. Combining Durability and Lightness With Precision for Surveying Transits. *Die Castings,* v. 8, Jan. 1950, p. 32-35.

Use of Al-alloy die castings. (T8, Al)

34T. Improved Method of Fabrication. *Die Castings,* v. 8, Jan. 1950, p. 36-37, 62.

New dishwasher, completely powered by water from the kitchen faucet, makes use of the lightness, corrosion resistance, and economy of Al die castings for eight major components. (T10, Al)

35T. The Basis for Selecting Alloy Cast Irons for the Petroleum Industry. Frederick G. Sefing. *Petroleum Refiner,* v. 29, Jan. 1950, p. 97-101; discussion, p. 101.

Properties available with alloy cast irons and special-service types such as Ni-Resist and Ni-Hard. (T29, CI)

36T. The Saguenay Is Bridged With Aluminum. *Engineering News-Record,* v. 144, Jan. 12, 1950, p. 32-35.

Details of design and erection procedures. (T26, Al)

37T. Steel Dam in Good Shape After 50 Years. George W. Lamb. *Engineering News-Record,* v. 144, Jan. 12, 1950, p. 36-37.

Located in Arizona. Soft open-hearth steel was used throughout except for rivets exposed to water, which are wrought iron. The structure has been painted at an average interval of 8 years. There is no sign of serious corrosion. (T4, ST)

38T. Factors in Gas Turbine Blade Production. *Aviation Week,* v. 52, Jan. 16, 1950, p. 27-28, 33-34. Based on "Blade Design and Production", by A. T. Colwell and R. E. Cummings.

Various methods include forging; lost-wax casting; machining; fabricating from sheet stock by forming and welding; sintering; rolling; and the "Mer-cast" process (use of frozen-mercury patterns instead of wax or plastic). (T25)

39T. Selection of Steel for Automobile Parts. What Engineers Should Know Today About Hardenability-Band Steels. Part VI. Where Standard H-Bands Do Not Apply. A. L. Boegehold. *SAE Journal,* v. 58, Jan. 1950, p. 47-51.

Special cases in which standard H-bands are not applicable. (T21, AY)

40T. Furnace Design and Practice. R. J. Sarjant. *Engineer,* v. 188, Dec. 23, 1949, p. 744-746; Dec. 30, 1949, p. 776-777.

Some modern features of practice in furnace heating, and certain fundamental aspects of design. First installment: Calculation of heat transmission in relation to furnace design. Final installment: Mechanization and instrumentation. (T5)

41T. Rapid-Heating Furnaces With Low Heat-Holding Capacity (Baffle Furnaces.) K. A. Valentinovicha. *Promyshlennaya Energetika* (Industrial Power), v. 6, Aug. 1949, p. 5.

Furnace in which a large part of the lining is replaced by a series of baffles with air spaces between them.

Such furnaces have so much lower heat-accumulating power than usual furnaces of the same rated power that they are heated more rapidly and heat losses are less. Design and operating characteristics. (T5)

42T. Reduction of Electric-Power Consumption of Electrical Resistance Furnaces by Increasing Their Efficiency. (In Russian.) K. A. Kostanya and I. M. Lur'e. *Promyshlennaya Energetika* (Industrial Power), v. 6, Aug. 1949, p. 10-11.

Possibility of saving power by shortening the heating coils. Production data indicate 50% increase of productivity with 25% reduction of power consumption. The method is applicable only if the furnace operates at temperatures not exceeding 800-850° C. (T5)

43T. (Book) **Edes Treasure Book.** 159 pages. 1949. Edes Manufacturing Co., Plymouth, Mass.

Brief articles by various authors outline procedures in photography, stripping, printing, zinc and copper etching, machining, finishing, proofing, etc. Includes a list of Edes photoengraving metals and a standard size and weight chart for metal sheets. (T9)

44-T. Torque Converter Produced With Stamped Steel Parts. R. C. Zeidler. *Automotive Industries,* v. 102, Jan. 15, 1950, p. 44-45, 114, 116.

Converter made by Detroit Gear Div. for Studebaker's automatic transmission. (T21, ST)

45-T. Magnesium in Navy Planes. J. E. Sullivan. *Aero Digest,* v. 60, Jan. 1950, p. 78, 80, 91, 93.

Previously abstracted from *Magazine of Magnesium.* See item 25D-27, 1949. (T24, Mg)

46-T. Design and Development Considerations of Bimetallic Brake Drum. Charles E. Stevens, Jr. *SAE Quarterly Transactions,* v. 4, Jan. 1950, p. 24-37; discussion, p. 37.

Previously abstracted from condensed version in *SAE Journal.* See item 24A-153, 1949. (T21)

47-T. Housing: Steel Breaks Record but Misses Jackpot. D. I. Brown. *Iron Age,* v. 165, Jan. 26, 1950, p. 61-68.

Uses of steel in residential building. Statistical data and forecast of future prospects. (T26, A4, CN)

48-T. Castings Can Do It Better! Bruce L. Simpson. *American Foundryman,* v. 17, Jan. 1950, p. 34-36.

Several cases in which castings replaced parts fabricated by other methods, resulting in cost savings and other advantages.
(T general, E general)

49-T. TV: Big Light Metals Consumer. *Modern Metals,* v. 5, Jan. 1950, p. 15.

Some applications of Al and alloys in television. (T1, Al)

50-T. Magnesium Printing Plates Cut Photo-Engraving Costs. *Modern Metals,* v. 5, Jan. 1950, p. 28.
(T9, Mg)

51-T. Corrosion Resisting Steels. I. Qualitative Review of Grades for Chemical Industry. II. Sources of Attack and Comparative Resistance. J. A. McWilliam. *Chemical Age,* v. 61, Dec. 3, 1949, p. 769-771; v. 62, Jan. 7, 1950, p. 15-18.

Part II includes tables showing quantitative weight losses of various steels resulting from attack by common acids. (T29, R5, SG-g)

52-T. Are Pressure Vessels Too Thick? Benjamin Miller. *Chemical Engineering,* v. 57, Jan. 1950, p. 95-98.

Arguments to show that conventional design codes require much excess wall thickness over that needed for reasonable safety. Based on fundamental principles of yield strength and metallurgical structure. Fifty natural-gas containers have been operated at 2240 psi. for three years without trouble, although their safe maximum operating pressure under the most liberal interpretation of the rules is 950 psi. (T26, Q23, ST)

53-T. Materials at Work. *Materials & Methods,* v. 31, Jan. 1950, p. 66-67.

Al roof for storage tanks; low-melting alloy and phenolic-resin matchplates; Mg safety blocks for metal-forming presses; square steel tubing; steel pressure chamber for testing submarine equipment; and polyethylene package.
(T general, Al, Mg, ST)

54-T. Steel Weldments Modify Crane Fabrication, Lower Production Costs. Dan Reebel. *Steel,* v. 126, Jan. 30, 1950, p. 50-52.

Use of weldments results in lighter, better-looking crane components together with attendant production savings. For some specific parts, a combination of weldments and castings produces the best product at the most reasonable cost.
(T5, K general, CN)

55-T. An Interesting Conversion. *Light Metals,* v. 13, Jan. 1950, p. 24-25.

Application of Al to doors of wood-drying kilns. (T29, Al)

56-T. On a New Housing Estate. *Light Metals,* v. 13, Jan. 1950, p. 26-29.

Unique applications of Al in a British housing project. (T26, Al)

57-T. Light Alloy at the Building Exhibition, Olympia, 1949. *Light Metals,*

v. 13, Jan. 1950, p. 38-55.

Varied applications of Al at British "show". (T26, Al)

58-T. Titanium Alloys for Aircraft. Nathaniel F. Silsbee. *Journal of the American Society of Naval Engineers,* v. 61, Nov. 1949, p. 908-913.

Reprinted from *Aero Digest.* See item 23D-53, 1949. (T24, Ti)

59-T. Heat Resistant Alloys for Aviation. F. S. Boericke. *Journal of the American Society of Naval Engineers,* v. 61, Nov. 1949, p. 952-957.

Previously abstracted from *Aero Digest.* See item 23A-22, 1949. (T24, SG-h)

60-T. Development of an Insert Rock Bit. John B. Baker. *Mining Congress Journal,* v. 36, Jan. 1950, p. 38-41, 57.

Research, laboratory, and field testing. Problems solved include materials selection, design, and brazing. Various carbides were tested for wear. (T28, SG-j)

61-T. Metallurgical Developments and the Mining Engineer. L. Sanderson. *Canadian Mining Journal,* v. 71, Jan. 1950, p. 70-72.

Materials and processes used to make the tools and equipment used by the mining engineer. (T28)

62-T. Large Pressure-Forgings. Their Significance for Military Aircraft; Existing and Proposed Manufacturing Facilities in the United States. K. B. Wolfe. *Aircraft Production,* v. 12, Jan. 1950, p. 23-26. (T24, F22)

63-T. Modern Wing Structures; The Importance of Tapered Sheet and Large Pressure-Forgings. S. Joseph Pipitone. *Aircraft Production,* v. 12, Jan. 1950, p. 27-32. (T24, F22)

64-T. The Great Joiner. Harold L. Flynn. *Steelways,* v. 6, Jan. 1950, p. 20-23.

Fabrication and applications of nails, (T7, CN)

65-T. Forced Convection Ovens in Process Engineering. N. R. Maleady. *Industrial Heating,* v. 17, Jan. 1950, p. 105-106, 108, 110, 112, 114-115.

General recommendations for design, operation, and applications. (T5)

66-T. High Temperature Applications of Ceramic Materials in Gas Turbines. *Industrial Heating,* v. 17, Jan. 1950, p. 124, 126. Based on paper by Winston H. Duckworth and I. E. Campbell.

Possibilities of gas turbines with higher operating temperatures, longer life, and lower weight. Ceramic stator blades, ceramic-coated parts, and metal-ceramic combinations are being investigated. The vapor-deposition coating process seems most promising. (T25, L25)

67-T. The Use of Corrosion-Resistant Alloy Steels in the Heavy Chemical Industry. F. H. Keating. *Nickel Bulletin,* v. 22, Dec. 1949, p. 186-190. (T29, AY, SS, SG-g)

68-T. Sintered Metallic Friction Materials Have Many Automotive Applications. Clyde S. Batchelor. *Automotive Industries,* v. 102, Feb. 1, 1950, p. 36-37, 78.

Uses and description of sintering procedure. (T21, H15)

69-T. Drilling for Oil With Large Precision Castings. K. J. Yonker and J. F. Henderson. *Iron Age,* v. 165, Feb. 2, 1950, p. 75-78.

New well-drilling method which uses 8 and 12-lb. precision castings as rotor and stator to drive cutting bits. Technique permits use of lower quality drill pipe. (T28, AY)

70-T. An Alternate to Lead Sheath for Telephone Cables. Anthony Paone. *Corrosion,* v. 6, Feb. 1950, p. 46-50; discussion, p. 50.

In new type of sheath moisture protection is provided by a combination of corrugated aluminum, moisture-resistant cement, and an outer poly-ethylene jacket. The new cable offers possibilities as an alternative to lead-sheath cable with corrosion protection for use in conduit. (T1, Al)

71-T. Zirconium Arc Lamp. *Electronics,* v. 23, Feb. 1950, p. 184, 186, 188.

New high-intensity electric arc light one-eighth as bright as the sun. The light source, which operates in the open air and not in a glass bulb, is a pool of molten zirconium metal which is maintained at a temperature near 6500° F. (T10, Zr)

72-T. Carbide Tool Design for Freedom From Brazing Stress. Malcolm F. Judkins. *Tool & Die Journal,* v. 15, Jan. 1950, p. 54-56, 102.

(To be continued.) (T6, K8)

73-T. Better Mold Liners for Dry Pressing Brick. Roy D. Haworth. *Iron Age,* v. 165, Feb. 9, 1950, p. 79-83.

Results of field and laboratory abrasion tests of steels for mold-liner use. Cast vs. rolled comparisons. High-C, high-Cr, and a modified high-speed steel were found to be the best materials. (T5, Q9, AY)

74-T. Light Overhead. *Die Castings,* v. 8, Feb. 1950, p. 19-20.

Uses of Cr-plated Zn die castings in light fixtures. (T10, Zn)

75-T. Magnetic Insert for New Type Latch. *Die Castings,* v. 8, Feb. 1950, p. 21.

Cupboard latch operating by means of a permanent magnet embedded in a Zn die casting, and a steel plate on the door. (T6, Zn)

76-T. Gears and Impellors. *Die Castings,* v. 8, Feb. 1950, p. 22-24.

A few miscellaneous examples made of die-cast Zn, Al, Mg, Sn, and Cu. (T7, EG-a)

77-T. Latch On to Lower Costs. *Die Castings,* v. 8, Feb. 1950, p. 27, 60-61.

Die-cast Zn hardware and fittings for house trailers. (T6, Zn)

78-T. Sound-Damping in Business Machines With Magnesium Die Castings. *Die Castings,* v. 8, Feb. 1950, p. 28-30.

Use of die-cast Mg alloys in the LaSalle Stenotype machine. (T10, Mg)

79-T. Tire Gauge Calls for Section Variation. *Die Castings,* v. 8, Feb. 1950, p. 33-34.

Combination tire inflator and gage with Al-alloy die-cast body used in garages and service stations. (T10, Al)

80-T. Vending Machines Show Versatility of Zinc Die Castings. *Die Castings,* v. 8, Feb. 1950, p. 36-38, 61-62.

Miscellaneous applications. (T10, Zn)

81-T. High-Temperature Fans Employ Unique Design Features To Obviate the Unbalancing Effects of Expansion. Herbert Chase. *Machine Design,* v. 22, Feb. 1950, p. 119-121.

New line of stainless-steel centrifugal fans that operate successfully and continuously at temperatures as high as 1800° F. (T10, SS)

82-T. Aluminum, Stainless, Plastics Combined in Precision Device. *Product Engineering,* v. 21, Feb. 1950, p. 95.

Device for measuring standing-wave ratio, impedance, and wavelength in the 60-2000-megacycle range used in development and adjustment of antennas, transmission lines, and associated equipment. (T1, Al, SS)

83-T. Cemented Carbides Used for Non-Cutting Applications. J. S. Gillespie. *Machinery* (American), v. 56, Feb. 1950, p. 184-185.

Various applications to machine parts where special characteristics are required. (T7, SG-j)

84-T. Production of Custom-Built Neon Signs and Architectural Panels. W. A. Barrows. *Finish,* v. 7, Feb. 1950, p. 23-26.

Operations include welding, forming, press operations, pickling, finishing, and enameling. (T26)

85-T. Basic Problems in the Engineering of a Modern All-Metal Motor Body. E. S. White. *Institution of Mechanical Engineers, Proceedings* (Automobile Div.), Part I, 1948-49, p. 10-15.

The range of materials (steels and Al alloys) from which a body may be made; and the relative merits of different forms of construction in the light of quantity production. An example of the way in which multiple pressing operations can be facilitated by careful sequence planning. A section on corrosion prevention is included. (T21, ST, Al)

86-T. Steel Castings in Machine Design. *Machinery* (London), v. 76, Jan. 12, 1950, p. 56-57.

Applications in heavy units required for use in rolling mills and associated finishing departments. (T5, CI)

87-T. The Design and Performance of Plain Bearings. Philip T. Holligan. *Engineering,* v. 169, Jan. 6, 1950, p. 9; Jan. 13, 1950, p. 55-56. A condensation.

Discusses advantages and disadvantages of the various bearing alloys and of different design arrangements. (T7, SG-c)

88-T. Technical Flow Principles of Industrial Furnaces. (In German.) Michael Hansen. *Archiv für das Eisenhüttenwesen,* v. 20, Nov.-Dec. 1949, p. 337-344.

The basic laws of heat flow. Wall and free turbulence. Value of use of scale models in furnace design. (T5)

89-T. The Aluminum Roof on the "S. Maria della Spina" Church in Pisa. (In Italian.) Gian Carlo Nuti. *Alluminio,* v. 18, Sept.-Oct. 1949, p. 481-492.

Roof installed following serious war damage. Includes description of chemical decorative and protective coating. 11 ref. (T26, Al)

90-T. Metal-Oxide Parts for Turbine Blades. *Metal Progress,* v. 57, Feb. 1950, p. 259-261. Condensed from *Industrial Bulletin* (Arthur D. Little, Inc.), Nov. 1949.

Present status of such blades for high-temperature uses such as jet engines, gas turbines, etc. (T25, SG-h)

91-T. Aluminum Milk Bottle Cases Slash Costs of Refrigeration and Handling. Fred L. Church. *Modern Metals,* v. 6, Feb. 1950, p. 14-15. (T29, Al)

92-T. Bridge Repair; A Vast New Field for Aluminum. *Modern Metals,* v. 6, Feb. 1950, p. 26.

Outlines potentialities. (T26, Al)

93-T. Magnesium Dockboard: Safe—Strong—Light. *Modern Metals,* v. 6,

Feb. 1950, p. 32-33.
Fabrication of dockboard for materials handling by welding and heat treatment; and advantages. (T5, Mg)

94-T. Catching the Dungeness. *INCO Magazine,* v. 23, Winter 1950, p. 10-11.
Use of Monel crab traps for avoidance of corrosion. (T10, Ni)

95-T. 305,800 Miles Without Firebox Trouble. *INCO Magazine,* v. 23, Winter 1950, p. 12.
Tests made to determine the relative value of Lukens Ni-Clad steel and carbon steel for firebox side sheets, and the performance of Monel staybolts as compared with the conventional type. (T23, Ni)

96-T. Postponing That Last Long Mile. *INCO Magazine,* v. 23, Winter 1950, p. 14, 25.
Use of Al alloy pistons with Ni-Resist ring inserts in truck engines for reduced wear. (T21, Al, CI)

97-T. Six Times the Life for Exhaust Pipes. *INCO Magazine,* v. 23, Winter 1950, p. 15-16.
Use of Inconel in truck exhaust pipes. (T21, Ni)

98-T. Refinery Flare Tip Saves $13,200. *INCO Magazine,* v. 23, Winter 1950, p. 16.
Use of Inconel avoids necessity for frequent replacement. (T29, Ni)

99-T. Anchoring a Ceramic Building Façade. *INCO Magazine,* v. 23, Winter 1950, p. 19, 29.
Use of Monel tie wire. (T26, Ni)

100-T. Steel Castings: Structural and Production Advantages; Specification Requirements for Aircraft Purposes. *Aircraft Production,* v. 12, Feb. 1950, p. 64-65.
(T24, CI)

101-T. Magnesium Wall Forms. *Light Metals,* v. 13, Feb. 1950, p. 80-83.
Advantages for the production of concrete foundations. (T26, Mg)

102-T. Evolution of Welded Box Car Design. *Mechanical and Electrical Engineer,* v. 124, Feb. 1950, p. 66-70. Condensed from report by L. E. Grant.
(T23, K general)

103-T. What Constitutes Good Glasshouse Irons. Kenneth McGrath, D. P. Forbes, and F. W. Dixon. *Glass Industry,* v. 31, Feb. 1950, p. 81-83, 106.
Desirable properties of cast irons used for molds in the glass factory. (T29, CI)

104-T. Materials at Work. *Materials & Methods,* v. 31, Feb. 1950, p. 68-70.
Steel die blocks, light-alloy motor grader, carbide scrapers, armored Al truck, stainless-steel heat exchanger, and several applications of nonmetals. (T general)

105-T. Record Loads in Aluminum Box Car. *Railway Age,* v. 128, Feb. 11, 1950, p. 46-48.
Details of boxcar built for Canadian railroad and believed to be the first ever constructed with an all-aluminum body including the underframe. Weight savings result in large increase in loading capacity.
(T23, Al)

106-T. Investigation of Failures in Railroad Rails. R. E. Cramer. *American Railway Engineering Association, Bulletin,* v. 51, Feb. 1950, p. 543-550.
Appendix 2-a of Report of A.R.E.A. Committee 4 on Rail. Details of examination of control-cooled rails which failed in service on various railroads; results of preliminary tests on rails with welded bond wires (torch and thermit welded).
(T23, S21)

107-T. Rail Failure Statistics. Ray McBrian, C. J. Code, C. B. Bronson, G. F. Hand, J. G. Roney, and A. A. Shillander. *American Railway Engineering Association, Bulletin,* v. 51, Feb. 1950, p. 550-566.
Report on Assignment 3 from Report of A.R.E.A. Committee 4 on Rail. Extensive statistics on failures reported up to Dec. 31, 1948, are tabulated and charted. (T23, S21)

108-T. Continuous Welded Rail. I. H. Schram, C. H. Blackman, T. A. Blair, B. Bristow, B. Chappell, C. J. Code, P. O. Ferris, H. S. Loeffler, R. F. Loga, R. R. Manion, Ray McBrian, E. H. McGovern, B. R. Meyers, R. J. Middleton, E. E. Oviatt, J. C. Ryan, A. P. Talbot, H. F. Whitmore, and R. P. Winton. *American Railway Engineering Association, Bulletin,* v. 51, Feb. 1950, p. 569-570.
Report on Assignment 6 from Report of A.R.E.A. Committee 4 on Rail. New installations, processes used, and failures. (T23, K general)

109-T. Service Tests of Various Types of Joint Bars. T. A. Blair, J. B. Akers, H. B. Barry, W. J. Burton, E. E. Chapman, C. M. Chumley, C. J. Code, P. O. Ferris, R. L. Groover, S. R. Hursh, L. R. Lamport, E. E. Mayo, Ray McBrian, E. H. McGovern, R. A. Morrison, Embert Osland, R. E. Patterson, W. C. Perkins, J. C. Ryan, and W. D. Simpson. *American Railway Engineering Association, Bulletin,* v. 51, Feb. 1950, p. 570-584.
Report on Assignment 7 from Report of A.R.E.A. Committee 4 on Rail. 1948 service-test installations and dynamic stress results obtained under various traffic conditions, indicating suitability of new designs.
(T23, S21)

110-T. Eighth Progress Report of the Rolling Load Tests of Joint Bars. R. S. Jensen. *American Railway Engineering Association, Bulletin,* v. 51, Feb. 1950, p. 585-593.

Appendix 8-a to Report of A.R.E.A. Committee 4 on Rail. Tests made at University of Illinois during past year. Hardness and rolling-load test data. Macrographs and micrographs of failed bar sections. (T23, S21)

111-T. Rail Fractures Resulting From Engine Wheel Burns, Including Effect of Repairing Such Burns by Oxy-acetylene or Electric Welding. J. B. Akers, J. E. Armstrong, H. B. Barry, C. H. Blackman, C. M. Chumley, H. R. Clarke, C. J. Code, L. S. Crane, C. B. Harveson, S. R. Hursh, H. S. Loeffler, R. F. Logan, Ray McBrian, L. T. Nuckols, E. E. Oviatt, W. C. Perkins, G. A. Phillips, J. G. Roney, E. F. Salisbury, F. S. Schwinn, A. A. Shillander, G. L. Smith, A. P. Talbot, R. P. Winton, and J. E. Yewell. *American Railway Engineering Association, Bulletin,* v. 51, Feb. 1950, p. 594-595.

Report on Assignment 9 of A.R.E.A. Committee 4 on Rail. Brief progress report includes tabulation of rolling-load test results. (T23, K1, K2, S21)

112-T. Causes of Shelly Spots and Head Checks in Rail; Methods for Their Prevention. L. S. Crane, C. H. Blackman, T. A. Blair, B. Bristow, C. B. Bronson, E. E. Chapman, C. J. Code, P. O. Ferris, J. L. Gressitt, G. F. Hand, C. B. Harveson, L. R. Lamport, C. C. Lathey, E. E. Mayo, Ray McBrian, E. H. McGovern, R. J. Middleton, L. T. Nuckols, Embert Osland, W. C. Perkins, G. A. Phillips, J. G. Roney, I. H. Schram, A. A. Shillander, G. L. Smith, Barton Wheelwright, R. P. Winton, and J. E. Yewell. *American Railway Engineering Association, Bulletin,* v. 51, Feb. 1950, p. 595-597.

Report on Assignment 10 of Report of A.R.E.A. Committee 4 on Rail. Research progress to date in connection with field tests by various railroads. (T23, S21)

113-T. Eighth Progress Report of the Shelly Rail Studies at the University of Illinois. R. E. Cramer. *American Railway Engineering Association, Bulletin,* v. 51, Feb. 1950, p. 597-607.

Appendix 10-a to Report of A.R.E.A. Committee 4 on Rail. Results of examinations of shelly rails from service and of laboratory tests designed to produce shelling. Results indicate that the laboratory tests are a quick method for determining probable service life. Tests were made on standard carbon-steel and alloy-steel rails. (T23, S21, CN, AY)

114-T. Summary Report on the Examination of Rails Which Contain Detail Fractures to Joint Contact Committee on Rails of Association of American Railroads and American Iron and Steel Institute and Committee on Rail of American Railway Engineering Association. J. E. Campbell, H. O. McIntire, and G. K. Manning. *American Railway Engineering Association, Bulletin,* v. 51, Feb. 1950, p. 608-620.

Appendix 10-b of Report of A.R.E.A. Committee 4 on Rail. Results of examination of 54 detail fractures found in service. Correlation of results with chemistry, mechanical properties, and structure was attempted. (T23, S21)

115-T. Recent Developments Affecting Rail Section. C. J. Code, J. E. Armstrong, T. A. Blair, C. B. Bronson, W. J. Burton, E. E. Chapman, H. R. Clarke, L. S. Crane, P. O. Ferris, G. F. Hand, S. R. Hursh, C. C. Lathey, H. S. Loeffler, R. R. Manion, Ray McBrian, B. R. Myers, R. J. Middleton, R. A. Morrison, W. C. Perkins, G. A. Phillips, F. S. Schwinn, and G. L. Smith. *American Railway Engineering Association, Bulletin,* v. 51, Feb. 1950, p. 620-625.

Report on Assignment 11 of Report of A.R.E.A. Committee 4 on Rail. Results with respect to fatigue and stresses, also corrosion. (T23, S21)

116-T. Measurements of Stresses in 132 RE Rail on Tangent Track—Santa Fe Railway. *American Railway Engineering Association, Bulletin,* v. 51, Feb. 1950, p. 626-640.

Appendix 11-a to Report of A.R.E.A. Committee 4 on Rail. Stresses were extensively determined. Results are correlated with fatigue-test data. (T23, Q7)

117-T. Fatigue Tests of Rail Webs. R. S. Jensen. *American Railway Engineering Association, Bulletin,* v. 51, Feb. 1950, p. 640-647.

Appendix 11-b to Report of A.R.E.A. Committee 4 on Rail. Laboratory test data and their evaluation as a part of a continuing research program. Corrosion-fatigue data in tap water of two types. (T23, R1)

118-T. Service Tests on Crossings. *American Railway Engineering Association, Bulletin,* v. 51, Feb. 1950, p. 653-660.

Appendix 4-a to Report of A.R.E.A. Committee 5 on Track. Results of service tests on several installations of Mn steel railroad crossings. (T23, S21, AY)

119-T. Prevention of Damage Resulting From Brine Drippings on Track and Structures. W. E. Cornell, F. J. Bishop, M. C. Bitner, Blair Blowers,

E. W. Caruthers, P. H. Croft, M. H. Dick, C. T. Jackson, H. F. Kimball, E. R. Murphy, C. E. Peterson, and C. E. Price. *American Railway Engineering Association, Bulletin,* v. 51, Feb. 1950, p. 661-663.

Report on Assignment 5 of Report of A.R.E.A. Committee 5 on Track. Results of laboratory and track tests in which various inhibitors were added to the brine solutions used in refrigerator cars to minimize corrosion. Sodium hexametaphosphate, and possibly disodium phosphate, give promise as nontoxic inhibitors. Use of other inhibitors poses serious toxicity problems. (T23, R10)

120-T. Aluminium Aids Television. *Metal Industry,* v. 76, Jan. 27, 1950, p. 71-73.

Use in parabolic reflectors used at relay stations. (T1, Al)

121-T. Results of Danish Experiments on Packing of Food in Aluminum Cans. (In French.) Bramsnaes. *Revue de l'Aluminium,* v. 26, Dec. 1949, p. 404-407. Condensed from *Revue Belge des Fermentations et des Industries Alimentaires.*

Tests carried out by the Danish Ministry of Fisheries indicate that aluminum is as good as tin plate and sometimes even better. Products take no metallic taste and do not blacken. The longest periods of preservation were obtained with anodized aluminum cans; or better, anodized and varnished cans. (T29, Al)

122-T. Aluminum Busbars. (In French.) *Revue de l'Aluminium,* v. 26, Dec. 1949, p. 408-412.

Practical data on the operation of aluminum busbars. Preparation of contact surfaces, welded or bolted joints, distribution of bolting pressure, expansion joints, and Al-Cu assemblies. (T1, Al)

123-T. High-Temperature Laboratory Furnace. (In Russian.) D. B. Ginzburg and A. T. Gelman. *Ogneupory* (Refractories), v. 14, Oct. 1949, p. 465-466.

Furnace incorporates air preheating and low-pressure oil burners. Temperatures up to 1760° C. may be obtained. Design details and specific characteristics. (T5)

124-T. (Book) **Punches and Dies. Ed. 4.** F. A. Stanley. 583 pages. McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. $4.75.

Practical fundamentals, layouts, construction, and various uses for specific work. Development of die design, use of metal stampings for complicated constructions where expensive forgings or castings were formerly used, sectional dies, and big press work is included. (T5, G1)

125-T. (Book) **Materials Engineering of Metal Products.** Norman E. Woldman. 583 pages. 1949. Reinhold Publishing Corp., 330 W. 42nd St., New York.

Materials for light-weight construction, mechanical products, the electrical industry, and for special and severe service. Advantages and disadvantages of various metals and alloys in specific service applications. Includes tabular data on physical properties and performance statistics, and illustrations showing various types of metal failures. Chapter bibliographies. (T general, S21)

126-T. Aluminium Roofing; Details of Reconstruction Project Completed at a Warrington Works. *Sheet Metal Industries,* v. 27, Feb. 1950, p. 126-127. (T26, Al)

127-T. Aluminum Single Arch Span at Arvida. *Iron Age,* v. 165, Feb. 23, 1950, p. 88.

Canadian bridge, believed to be the first of its type. (T26, Al)

128-T. Fifty Years of Light Metal Progress in Architecture. *Light Metal Age,* v. 8, Feb. 1950, p. 8-10, 34.

Modern applications of Al in architecture. (T26, Al)

129-T. Aluminum Air-Borne Prefabs. *Light Metal Age,* v. 8, Feb. 1950, p. 11.

Prefabricated structure of aluminum panels designed to be flown to forward bases. (T26, Al)

130-T. Dramatic Application of Aluminum in British Architecture. *Light Metal Age,* v. 8, Feb. 1950, p. 12-13.

Miscellaneous examples. (T26, Al)

131-T. Aluminum Accordion Insulation. Alexander Schwartz. *Sheet Metal Worker,* v. 41, Feb. 1950, p. 37-38, 88.

Elimination of moisture traps, high insulating value, extreme light weight, and ease of installation are among the advantages claimed for unique insulation. Installation procedure. (T26, Al)

132-T. Stainless Steel for Plating Room Exhaust. *Sheet Metal Worker,* v. 41, Feb. 1950, p. 47-48. (T5, SS)

133-T. Monel and Copper on Big Truck Terminal. *Sheet Metal Worker,* v. 41, Feb. 1950, p. 52-53.

Various roof uses. (T26, Ni, Cu)

134-T. The Vincent Motorcycle. P. E. Irving. *Light Metals,* v. 13, Jan. 1950, p. 5-7; Feb. 1950, p. 70-75.

Use of Al alloys in British motorcycle. (T10, Al)

135-T. An Investigation of Die Blocks. I. (In Japanese.) Akira Adachi. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, May 1949, p. 35-39.

Chemical compositions, physical and mechanical properties of Cr, Cr-Mn, Cr-V, Cr-W, and Cr-W-V steels studied to find a substitute material of lower cost for die blocks. (T5, TS)

136-T. Research Study Evaluates Mold Liner Materials. Roy D. Haworth, Jr. *Brick & Clay Record,* v. 116, Mar. 1950, p. 67-69, 74.

See abstract from *Iron Age,* item 73-T, 1950. (T5, Q9, AY)

137-T. Alloy Steel Cuts Preparation Maintenance. *Coal Age,* v. 55, Mar. 1950, p. 78-79.

Special heat treated alloy steel plate for chute bottoms and liners is expected to save over $130,000 in operating cost during service life at New Vestaburg preparation plant of Jones & Laughlin Steel Corp. (T5, AY)

138-T. Types of Carbide Cutting Tools and Their Specific Applications. (Continued.) W. L. Kennicott. *Tool & Die Journal,* v. 15, Mar. 1950, p. 52-54, 56.

(T6, SG-j)

139-T. Tungsten Carbide Drilling on the Marquette Range. A. Eugene Lillstrom. *Skillings' Mining Review,* v. 38, Mar. 11, 1950, p. 1, 6, 14.

(T28, SG-j)

140-T. Experiment Proves Value of Metal Roof Beams. Rolf W. Roley. *Mechanization,* v. 14, Feb. 1950, p. 87, 90-91.

Use of Mg alloy beams to support mine roofs. (T26, Mg)

141-T. Underground Aluminum Gas Line. *Industry & Welding,* v. 23, Mar. 1950, p. 30-31.

Pipeline made of extruded 53S-T6, 8⅝ in. o.d., and ¼ in. thick. Welding methods. (T29, K general, Al)

142-T. Tungsten Carbide Bits at the Britannia Mine. P. W. Billwiller. *Canadian Mining and Metallurgical Bulletin,* v. 43, Feb. 1950, p. 69-73; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 53, 1950, p. 49-53.

Use in drilling operations. (T28, W, SG-j)

143-T. High-Pressure Vessels for the Oil-Refining and Chemical Industries. H. B. Fergusson. *Engineering,* v. 169, Feb. 10, 1950, p. 149-150. A condensation.

Design, choice of materials, and production methods. Welding, forming, and stress-relief annealing. (T26, G general, K general, J1)

144-T. Graphite Electrodes in Electrometallurgy. (In French.) M. J. Durand. *Journal du Four Electrique et des Industries Electrochimiques,* v. 58, Nov.-Dec. 1949, p. 135-138.

Properties and utilization in electrometallurgical furnaces. (T5, C)

145-T. Pure Iron in Surface-Coating Technology. (In German.) H. Kalpers. *Metalloberfläche,* sec. A, v. 3, Dec. 1949, p. 218-219.

Corrosion and heat resistance of commercially pure iron (not over 0.15% of C, Si, Mn, S, and P combined). Applications in chemical, metallurgical, and related industries as a base for paints, plating, enamels, etc. (T29, T5, L general, Fe)

146-T. Copper and Copper-Alloy Springs. (In German.) E. Tschanter. *Metall,* v. 3, Dec. 1949, p. 424-426.

Physical properties of copper and 12 Cu alloys; procedure of manufacturing the springs; the fatigue behavior of copper and of 24 Cu binary and ternary alloys with Zn, Sn, Ni, Be, Co, Si, Mn, Cr, Al, and Fe; and the effect of temperature on their respective elasticity moduli. (T7, Cu)

147-T. Special Shapes for Small Tools. *Die Castings,* v. 8, Mar. 1950, p. 21, 62-63.

Use of Zn die castings in Speedex wire strippers. (T6, Zn)

148-T. Protection Against Wind and Rain. *Die Castings,* v. 8, Mar. 1950, p. 22-24.

Use of Zn die castings for housing of television-antenna rotator. (T1, Zn)

149-T. A Staple Design. *Die Castings,* v. 8, Mar. 1950, p. 27-28.

Body, base and plunger of paper stapler are die cast in aluminum. (T10, Al)

150-T. Use Die Castings To Put the Best Foot Forward. *Die Castings,* v. 8, Mar. 1950, p. 29.

Use of Zn die castings in coin-operated shoe-shine machines. (T10, Zn)

151-T. Precision Instruments for a Mass Market. *Die Castings,* v. 8, Mar. 1950, p. 32-34.

Use of Zn and Al die castings in rugged draft gages and air-velocity meters, used in measuring the efficiency of home heating and ventilating systems. (T8, Zn, Al)

152-T. Tubes and Scoops. *Die Castings,* v. 8, Mar. 1950, p. 36-38.

Use of die-cast Al in sausage-

stuffer tubes, hand scoops, and lard paddles. (T29, Al)

153-T. Magnesium Reduces Weight of Saw. *Machine Design,* v. 22, Mar. 1950, p. 118.

Portable power saw weighing only 25 lb. yet developing 3 hp. (T5, Mg)

154-T. Graphite Electrodes. H. G. MacPherson. *Journal of Metals,* v. 188, Mar. 1950, p. 481-484.

Thermal gradients and strains during rapid cooling. Degree of thermal shock resulting when an electrode column is pulled rapidly from an electric steel furnace. Measurements to determine thermal conductivity, thermal expansion, modulus of elasticity, and strength. (T5, D5, C)

155-T. Three-Leaf Automobile Spring Built at Less Cost. A. H. Allen. *Steel,* v. 126, Mar. 20, 1950, p. 80-81, 106.

New "broadbeam" unit, designed primarily for passenger-car use which requires less labor in fabrication and assembly and has excellent mechanical features. (T7, Q5, Q28, AY)

156-T. Expanded Metal Grids Reduce Resistor Weight. *Product Engineering,* v. 21, Mar. 1950, p. 98.

In place of the wires, ribbons, or cast grids ordinarily used as heating elements, the "Multipath" resistor employs mesh-type sheet, stainless steel, or Al alloys. (T1, SG-q, SS, Al)

157-T. Approximate Relative Costs of Various Spring Materials. H. E. Machado. *Product Engineering,* v. 21, Mar. 1950, p. 161.

Chart shows relative costs vs. wire diameters for ten common ferrous and nonferrous materials. (T7, SG-b)

158-T. Longer-Lasting Materials for Truck & Bus Mufflers. *SAE Journal,* v. 58, Mar. 1950, p. 46-47. Based on "Better Exhaust Systems for Trucks and Buses", by E. E. Bryant.

Relative merits of various metals, alloys, and coatings, including aluminized steel, "zinc grip", terne plate, porcelain-coated steel, and stainless steel. (T21, SG-g, h, Al, Zn, CN, SS)

159-T. Paths to Better Engine Lubrication. *SAE Journal,* v. 58, Mar. 1950, p. 70-72. Based on "Valve, Ring, Cylinder Sleeve, and Other Designs as Aids to Lubrication", by A. T. Colwell and A. L. Pomeroy.

Recent design and metallurgical advances in valves, pistons, and cylinder sleeves which improve engine lubrication. (T21)

160-T. Gas Turbines; High Temperature and High-Strength Steels. *Iron and Steel,* v. 23, Mar. 1950, 85-87, 98. Based largely on Chapter VII, "Gas Turbines and Jet Propulsion for Aircraft", Ed. 5, by G. Geoffrey Smith (Iliffe & Sons, Ltd., London).

Designer's requirements are considered in relation to materials now available and their properties. (T25, AY, SG-h)

161-T. Steels Employed in Die Casting Aluminium. A. Hazell. *Machinery* (London), v. 76, Feb. 23, 1950, p. 280.

Recommended compositions and heat treatment. (T5, J general, E13, AY, Al)

162-T. Aluminium for Road Vehicles. *Engineering,* v. 169, Feb. 24, 1950, p. 228.

Summarizes symposium of six papers presented in London. (T21, Al)

163-T. Investigation of Cast Irons for Resistance-Heating Elements. (In Portuguese.) Lino de Lacerda Santos and Tomio Kitice. *Boletim da Associacao Brasileira de Metais,* v. 5, Oct. 1949, p. 461-472; discussion, p. 472-476.

A study of different ferrous alloys of the cast-iron type. Physical properties, in particular electrical conductivity of individual alloys; applicability for heating elements. (T1, P15, CI, SG-q)

164-T. (Book) **A.S.T.M. Standards on Electrical Heating, Resistance, and Related Alloys.** 170 pages. 1948. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

Standards for the above as well as thermostat metals, contact materials, materials for lamps and radio tubes, and structural and electrical-resistor materials for furnaces. (T1, SG-q, r, a)

165-T. In Hotel and Restaurant. *Light Metals,* v. 13, Mar. 1950, p. 115-119.

Miscellaneous applications of Al. (T10, Al)

166-T. Aluminium-Alloy Lifeboats. *Light Metals,* v. 13, Mar. 1950, p. 122-124.

(T22, Al)

167-T. Ideal Home Exhibition. *Light Metals,* v. 13, Mar. 1950, p. 132-139.

Use of Al in decorative arch. (T26, Al)

168-T. Progress Report—Aluminium in Athletics. *Light Metals,* v. 13, Mar. 1950, p. 129-131.

Use in athletic equipment at the Olympic Games of 1948. (T10, Al)

169-T. Demountable Buildings. *Light Metals,* v. 13, Mar. 1950, p. 156-160.

Australian Al-alloy prefabricated buildings such as garages. (T26, Al)

170-T. Prefabricated Aluminum Houses. Tom Bishop. *Metal Progress,* v. 57, Mar. 1950, p. 338.

Secondary Al alloys, originally obtained from the accumulation of scrap material salvaged from German aircraft destroyed over Britain, form the basic material used in the manufacture of prefabricated houses at Gloucestershire, England. Constructional and fabrication details. (T26, Al)

171-T. Aluminum Fins for Tubes. *Electronics,* v. 23, Apr. 1950, p. 206, 208.

Used for cooling high-power transmitting tubes. A new bonding process employs a hollow steel core that surrounds the copper anode, and is soldered easily to it. A muff of aluminum is cast and bonded to the steel. 140 aluminum radiator fins are brazed to this muff. (T1, K general, Al)

172-T. Low-Cost Aluminum Beverage Cases Now Mass-Produced. *Modern Metals,* v. 6, Mar. 1950, p. 19-20. (T29, Al)

173-T. Portable Grain Conveyor Uses Aluminum to Advantage. *Modern Metals,* v. 6, Mar. 1950, p. 34-35. (T3, Al)

174-T. Aluminum Sleeping Cars for Three Roads. *Railway Age,* v. 128, Mar. 18, 1950, p. 52-56. (T23, Al)

175-T. Plastics Vs. Metals in Engineering Applications. William Schack. *Materials & Methods,* v. 31, Mar. 1950, p. 49-52.

Tabular comparison of properties. Case histories in which plastics have replaced metals. (T general, Q general, P general)

176-T. The Place of Aluminium in Packaging. E. G. West. *Metallurgia,* v. 41, Feb. 1950, p. 204-208.

Present applications and future prospects. Types and requirements of package, packaging material, foil, collapsible tubes, cans, pressed containers, barrels, and crates. (T10, Al)

177-T. Anodes. (In German.) Edmund R. Thews. *Metalloberfläche,* sec. B, v. 2, Feb. 1950, p. 25-28.

The most important properties of anodes, and the factors which indirectly affect their efficiency and life. Shows that the decomposition products deposited on anodes often have a favorable effect on the reaction. Anode materials and methods of fabrication. (T5, L17, C23)

178-T. Silent Wardens. Eleanor Harvill. *Steelways,* v. 6, Mar. 1950, p. 21-23.

How hacksaw-resisting bars are made for prisons. They contain Cr-alloy inserts which resist sawing and drilling. The carbon steel provides toughness. Molten steel is poured around the inserts to form ingots which must be rolled and shaped, then heat treated. (T26, D9, CN, AY)

179-T. New Diesel Engine Weighs Under 5 Lb/Hp. W. F. Bradley. *Automotive Industries,* v. 102, Apr. 1, 1950, p. 30-32, 80.

British diesel engine features compact V-8 design and extensive use of light alloys. Also uses of phosphor bronze and alloy steels. (T25, Al, Cu, AY)

180-T. HSS, Plus High Angles, Mills Like Carbide. Walden F. Sinawski. *American Machinist,* v. 94, Apr. 3, 1950, p. 122-123.

Claims that the advance of carbides has been so rapid that full possibilities of high speed steel have not been realized. Recent experiments reported show that "impossible" speeds can be attained with reground scrap cutters. (T6, G17, TS)

181-T. Cutting Tool Materials. *Steel,* v. 126, Apr. 3, 1950, p. 98-101.

Lower machining costs are achieved by first checking relative efficiencies of high speed steels, cast alloys and carbides in the laboratory. Cast types show up well but must be chosen carefully. "Cast alloy" resembles steel in appearance but contains Fe only as an impurity. It cannot be forged, heat treated, or machined, except by grinding. It is principally a mixture of Cr, W, and Co, with minor percentages of C, V, Mn, Ta, or Fe. It withstands temperatures up to 1600° F. Standard tip designs and comparative performance data. (T5, G17, SG-j)

182-T. The Big Show's Still Colossal! *Steel Horizons,* v. 12, Spring 1950, p. 3-5.

Applications of stainless steel in the circus. (T10, SS)

183-T. Mr. Winter Cries "Uncle!" *Steel Horizons,* v. 12, Spring 1950, p. 6-7.

Production of stainless-steel storm windows. Piercing, forming, and projection welding. (T26, G1, K3, SS)

184-T. What Are 4,500,000 Miles to a Stainless Steel Train? *Steel Horizons,* v. 12, Spring 1950, p. 8-9, 22.

Good condition of Burlington's "Zephyrs" after 12 years of service. (T23, SS)

185-T. Fasteners: Mighty Mites of Industry. *Steel Horizons,* v. 12, Spring 1950, p. 10-11.

Cold heading, forming, and applications of stainless-steel screws and bolts. (T7, G10, SS)

186-T. Crafty Tricks With Stainless. *Steel Horizons,* v. 12, Spring 1950, p. 16-17.

Stainless steel accessories for hotels, bars, soda fountains, and restaurants. (T29, SS)

187-T. Briefs on the Horizon. *Steel Horizons,* v. 12, Spring 1950, p. 20-21.

Miscellaneous applications of stainless steel and special alloy steels. (T general, SS, AY)

188-T. Over the Horizon in a Stainless Steel Laboratory. *Steel Horizons,* v. 12, Spring 1950, p. 23-25.

Proposed standardized stainless-steel laboratory units which can be arranged to suit needs of users. (T26, T10, SS)

189-T. Twenty-Three Aluminum Sleepers. *Railway Mechanical and Electrical Engineer,* v. 124, Apr. 1950, p. 188-191.

Constructional features. (T23, Al)

190-T. Galvanized Bridge Wire: Basic Unit of Americanized Prestressed Concrete Design. Blair Birdsall. *Steel,* v. 126, Apr. 10, 1950, p. 100, 115, 118.

How cold-drawn steel wire for prestressing of concrete is made by John A. Roebling's Sons Co. Contrasts American and European practice. Mechanical properties tabulated. (T26, Q general, CN)

191-T. Carbide Die Developments. George Eglinton. *Tool Engineer,* v. 24, Apr. 1950, p. C8-C12.

Design factors, including the need for redesign from that used for steel dies to obtain the most satisfactory results. Typical dies, and cost savings for one example. (T5, C)

192-T. Die Castings Give Lift To Realistic Toy Truck. *Die Castings,* v. 8, Apr. 1950, p. 19, 59-62.

Application of Al and Zn die castings. (T10, Al, Zn)

193-T. Use of Several Alloys Gives Special Properties. *Die Castings,* v. 8, Apr. 1950, p. 20-22, 55.

Uses of brass, Zn, and Al die castings in gas meters and other instruments. (T8, Al, Cu, Zn)

194-T. Deep Drawn or Die Cast? *Die Castings,* v. 8, Apr. 1950, p. 23-24, 27, 55-56.

Advantages of Zn-alloy die castings for auto-heater housings. (T10, Al)

195-T. For Scale Models: Fine Detail; Low Tool Cost; Easy Finishing. *Die Castings,* v. 8, Apr. 1950, p. 28-29, 62-63.

Use of Pb die castings for small-scale industrial, commercial, and military models, and hobbies. (T10, Pb)

196-T. New Design for Electric Conduit Fittings. *Die Castings,* v. 8, Apr. 1950, p. 32-34, 56-58.

Use of special Al-alloy die castings. Advantages over cast-iron or machined products. (T1, Al)

197-T. Using Ceramic Coating for Specialized Applications. Walter Rudolph. *Finish,* v. 7, Apr. 1950, p. 19-21.

High-temperature ceramic coatings prove useful for applications varying from pump cylinders to components for B-36 bombers and jet engines. (T24, T25, L27)

198-T. Precision Porcelain. R. A. Weaver, Jr. *Finish,* v. 7, Apr. 1950, p. 42-44.

Otis Elevator Co. experiments successfully with a porcelain-enamel escalator step riser. (T26, L27)

199-T. Bronze Glass Molds Replacing Cast Iron Glass Molds. Vladimir A. Grodsky. *Journal of the Optical Society of America,* v. 40, Mar. 1950, p. 177.

An Al bronze containing Cu, Al, Fe, Mn, and Ni is used at the U. S. Naval Gun Factory, Washington, for molds for optical glass. It can easily be cast, forged, machined, polished and welded. It has good corrosion resistance, and a heat conductivity considerably higher than that of iron; also when heated, it acquires a self-healing protective oxide coating. (T29, Cu)

200-T. Development in the Use of Steel for Underground Support. F. J. Haller. *Mining Engineering; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, Apr. 1950, p. 475-478.

Experience over the past six years, involving more than five miles of permanent underground mine openings, has proved that steel is permanent, safer and, in the long run, cheaper than either treated or untreated wood supports. (T28, CN)

201-T. Corrosion Resistant Materials and Coatings in Trail Chemical Operations. E. A. G. Colls. *Mining Engineering; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 187, Apr. 1950, p. 491-494.

Corrosion in above plants producing ammonia, sulfuric, nitric and phosphoric acids, ammonium phosphates, sulfate and nitrate, together with miscellaneous allied material problems and their solution using erosion or corrosion-proof materials. (T29, R6, SG-g)

202-T. Use of Tantalum Mesh to Repair a Large Surgical Defect in the Anterior Abdominal Wall. R. A. Bussabarger, M. L. Dumouchel, and William H. Ivy. *Journal of the American Medical Association,* v. 142, Apr. 1, 1950, p. 984-985.
(T10, Ta)

203-T. Metallurgical Materials in the Coal-Mining Industry. C. S. Thomas. *Quarterly of the Colorado School of Mines,* v. 45, June 1950, p. 39-60.
Varied applications; properties and uses of the different alloys. (T28)

204-T. Noble Metal Catalysts; All-Round Efficiency of Rhodium-Platinum Alloys. *Chemical Age,* v. 62, Mar. 18, 1950, p. 404, 406.
Production and use in mesh form. Alloys contain up to 10% Rh.
(T29, Pt)

205-T. Alloy Steels for Plastic Moulds and Hobs. L. Sanderson. *Metallurgia,* v. 41, Mar. 1950, p. 248-250.
(T5, AY, TS)

206-T. Aluminium Alloys for Mine-Shaft Equipment. New Cages at Gresford Colliery. *Metallurgia,* v. 41, Mar. 1950, p. 268-269.
(T28, Al)

207-T. Steels for Specialized Applications. J. M. Mowat. *Engineering,* v. 168, Mar. 24, 1950, p. 338-339. A condensation.
Effects of alloy steel refining, forging, and heat treatment procedures on properties of forgings. Procedure of British firm in production of steam-turbine rotors.
(T25, D general, F22, J general, AY)

208-T. Packaging and Bottling Show. (In French.) Pierre Prévot. *Revue de l'Aluminium,* v. 27, Jan. 1950, p. 25-33.
Numerous applications of Al included among the exhibits.
(T general, Al)

209-T. Nickel-Clad Steel in the Beet Sugar Industry. *Nickel Bulletin,* v. 23, Feb. 1950, p. 26.
(T29, Ni, CN)

210-T. Metal Problems in the Container Field—and Amplifying Statements. Neil M. Waterbury and F. George Pasotti. *Ceramic Industry,* v. 54, Apr. 1950, p. 112-113, 115, 172.
Properties and applications of miscellaneous metals and alloys in glass-container production. (T29)

211-T. Special Burner Converts Gas Furnace for Oil. G. J. Gollin. *Iron Age,* v. 165, Apr. 13, 1950, p. 89-92.
British-designed Y-type burner which permits combustion of fuel oil in furnaces originally designed for natural gas. Design considerations were combustion characteristics, furnace space requirements, flame sizes, burner-clogging clearances, and fuel-feed turn-down ranges. Miscellaneous industrial applications.
(T5, J general)

212-T. Ethylene Production by Cracking of Propane-Ethane Mixtures. Part 2. Tube Selection and Inspection. C. K. Buell and L. J. Weber. *Petroleum Processing,* v. 5, Apr. 1950, p. 387-391.
Erosion of tube metal by hard carbon particles constitutes the greatest mechanical problem in the operation of these cracking furnaces. As a result of extensive plant tests, 18-8 Cr-Ni alloy tubes were selected for positions near the outlet of the cracking coil, while 25-20 Cr-Ni tubes are used where service is less severe. The welded-coil type of construction has proved entirely feasible.
(T29, Q9, SS)

213-T. Don't Gamble in Selecting Tool Steels. Hugo Becker. *American Machinist,* v. 94, Apr. 17, 1950, p. 102-105.
Recommended applications of 22 standard toolsteels for metal cutting, hot and cold forming, die casting, plastic molding, and hand tools.
(T5, T6, G general, E13, TS)

214-T. Aluminum Plant Is Built of Aluminum. *Factory Management and Maintenance,* v. 108, Apr. 1950, p. B90-B92.
Picture story of a plant built by the Aluminum Co. of America. Advantages over other materials.
(T26, Al)

215-T. Welded Frame Construction Cuts Building Costs. *Factory Management and Maintenance,* v. 108, Apr. 1950, p. B96-B97.
Application at Perkins Products Co., Chicago. (T26, K general, CN)

216-T. Engineer's Forum on Diesel Piston-Ring and Cylinder Wear. *SAE Journal,* v. 58, Apr. 1950, p. 34-38; discussion, p. 38-41. Based on "Piston Ring Design and Application and Their Effect on Wear", by A. M. Brenneke.
Effects of coolant temperature, of cylinder-liner microstructure, of fuel and lubricant composition, of material used in rings (gray cast iron, alloyed iron, Cr-plated iron) and of ring design, D. A. Paull and Stuart Nixon, M. R. Bennett, W. J. Pelizzoni, Paul S. Lane, Ralph L. Boyer, H. C. Braendel, A. W. Pope, Jr., L. D. Thompson, and D. J. Cummins contribute to the discussion.
(Q9, T21, CI)

217-T. Aluminum Does Steel's Job in Airplane Engine Mounting. *SAE Journal,* v. 58, Apr. 1950, p. 42-45. Excerpts from "Fatigue Life of Aircraft Engine Mounting Components", by R.

C. Henshaw, L. Wallerstein, Jr., and S. J. Zand.

By substituting Al forgings for steel, a weight saving of 250 lb. on a 4-engine airplane was achieved. Applying results from test work and certain design principles made it possible to get superior endurance life from these highly-stressed Al-alloy aircraft components. (T24, Q7, Al)

218-T. Magnetic Materials. A. Boggs. *Western Union Technical Review,* v. 4, Apr. 1950, p. 79-85.

Theory of magnetism, properties of the various magnetic materials, and their applications in electricity and electronics. (T1, P16, SG-n, p)

219-T. Carbide Insert Bit Drilling at the Cleveland-Cliffs Iron Co. Mines, Ishpeming, Mich. Walter E. Lewis. *U. S. Bureau of Mines,* Information Circular 7558, Mar. 1950, 16 pages.

Tests and results of comparing performance of WC insert bits and steel detachable bits. Includes tables and photographs of results. (T28, C, TS)

220-T. The Use of Metal Powders in Engineering. H. W. Greenwood. *Machinery* (London), v. 76, Mar. 23, 1950, p. 419-421.

A survey, excluding powder metallurgy. Covers brazing powders, powdered solders, thermit welding, filtration elements, "powder welding", metallizing, the magnetic clutch, and Al powder in "Aerocrete"—a porous, light-weight material having good thermal and sound insulating properties. (T general)

221-T. Anodes. (In German.) Edmund R. Thews. *Metalloberfläche,* sec. B, v. 2, Feb. 1950, p. 25-28; Mar. 1950, p. 40-43.

The most important properties of anodes and the factors which indirectly affect their efficiency and life. The decomposition products deposited on anodes often have a favorable effect on the reaction. Anode materials and methods of fabrication. Choice of Cu anodes for given electrodes, as affected by methods of production. Effects of anodic and cathodic polarization. (T5, C23, L17)

222-T. Eccentricity of Pressure-Coated Electrodes. (In German.) Paul Wimmer. *Schweisstechnik,* v. 4, Feb. 1950, p. 13-18.

Causes of eccentricity in the production of coated electrodes by various methods. Proposes that the flow of the coating material be controlled so as to be in the direction of the core axis, in order to prevent occasional pressure variation from bending the core wire. (T5, K1)

223-T. Indianapolis Race Car Has Sheet Aluminum Frame. R. Raymond Kay. *Automotive Industries,* v. 102, Apr. 15, 1950, p. 36, 102, 104.

(T21, Al)

224-T. Aluminum Foil Proves Practical for Packaging. Joseph Geschelin. *Automotive Industries,* v. 102, Apr. 15, 1950, p. 41, 110, 112.

Use for packaging finely machined automotive parts at extremely low cost and with excellent protection against corrosion in transit as well as on the shelf. (T7, Al)

225-T. Powder Parts Add Up. Peter Mondy. *Iron Age,* v. 165, Apr. 20, 1950, p. 80-82.

Use of powdered-metal parts made to very close tolerances by Burroughs Adding Machine Co. to replace parts made by conventional methods. Precision to 0.001 in. is not uncommon and no further machining is needed. Materials include bronze. (T10, H general, Cu)

226-T. Powder Magnets Replace Latch. *Iron Age,* v. 165, Apr. 20, 1950, p. 97.

Use of Alnico magnets in refrigerator door-closing device. (T7, H general, SG-n)

227-T. Aluminum in Road Transport. *Light Metals,* v. 13, Mar. 1950, p. 160-165; Apr. 1950, p. 186-191.

Proceedings of symposium of Aluminium Development Association held on Feb. 14, 1950 in England. (T21, Al)

228-T. A Modern Metallic Yarn. *Light Metals,* v. 13, Apr. 1950, p. 192-194.

Al-foil + plastic laminate produced in the U. S. Because of its nontarnishing qualities it is particularly suitable for dress fabrics and for furnishings. (T10, Al)

229-T. The Developing Uses of Light Alloys for Boat Building. G. L. R. Watkins. *Light Metals,* v. 13, Apr. 1950, p. 206-214.

(T22, Al, Mg)

230-T. Metal-Base Permanent Lubricant. *Aviation Week,* v. 52, May 1, 1950, p. 39.

Properties of colloidal solution of molybdenum, for use alone or as additive which resists high temperatures and pressures. (T29, Mo)

231-T. The Shadelite Marquee. *Modern Metals,* v. 6, Apr. 1950, p. 21-22.

Unique aluminum awning, which resembles a horizontal venetian blind. Made of 6-ft. lengths of 61S-T Alclad, it allows glare-free light to pass, but catches rain and snow in troughs which carry it to downspouts. (T26, Al)

232-T. Canada's First Aluminum Bridge: A Preview of Things To Come? *Modern Metals,* v. 6, Apr. 1950, p. 24-26.
(T26, Al)

233-T. Fifty-Two Years of Electrical Conductors for Power Transmission. Robert F. McGeever. *Modern Metals,* v. 6, Apr. 1950, p. 39-42.
Development of use of Al for wire, cable, and bus bar. (T1, Al)

234-T. Extruded Aluminum Irrigation Pipe. *Modern Metals,* v. 6, Apr. 1950, p. 45-46.
(T3, Al)

235-T. Unusual Aluminum and Bronze Ceiling. *Sheet Metal Worker,* v. 41, Apr. 1950, p. 43-45.
Details of construction of ceiling in the lobby of an office building. Forming and spot welding operations. (T26, G general, K3, Al, Cu)

236-T. Why Beryllium Copper for Springs? *Mainspring,* v. 13, Apr. 1950, p. 1-5.
Physical and mechanical properties; design information.
(T7, Q general, P general, Cu)

237-T. A Light-Alloy Dragline Bucket Which Lasted Four Times as Long as a Steel One. (In French.) *Revue de l'Aluminium,* v. 27, Feb. 1950, p. 48-49.
British bucket, having a capacity of 17.7 cu. ft. which remained in service for 14 months and shifted nearly 3.5 million cu. ft. of sand before needing repairs. It is claimed that four equivalent steel buckets are worn out by the same amount of service. (T4, Al)

238-T. Research on Roadbed Materials and Problems in This Field. (In German.) Walter Janiche. *Stahl und Eisen,* v. 70, Mar. 2, 1950, p. 174-186.
An extensive survey of available information on railroad rails; factors affecting their mechanical properties; causes of fracture, wear, and corrosion; methods of testing and of welding. Test results show that a Cu content of 0.25% greatly increases wear resistance of rail steel. 31 ref.
(T23, Q general, R general, K general, CN)

239-T. Cost-Cutting Methods in Piston-Ring Production. George H. DeGroat. *Machinery* (American), v. 56, May 1950, p. 141-150.
Equipment and procedures of Piston-Ring Div., Koppers Co. Centrifugal casting from a high-strength Fe alloy, annealing, heat-forming, machining, and inspection.
(T7, E14, G17, J23)

240-T. Making a Half-Ton Spline Broach. *Machinery* (American), v. 56, May 1950, p. 151-153.
Broach was produced from a 4000-lb. ingot of 18-4-1 high-speed steel. Several reheatings and breakdown operations were required to forge the ingot into a suitable size for subsequent swaging. Machining operations included rough turning, drilling, thread cutting, grinding.
(T6, F22, G17, TS)

241-T. Aircraft Rivets. *Western Machinery and Steel World,* v. 41, Apr. 1950, p. 84-85.
Heading, heat treatment, and plating. Rivets are Al, Monel, and steel.
(T7, G10, J general, L17, Al, Ni, ST)

242-T. Materials Substitution Plan for Turbojets. *Aviation Week,* v. 52, May 8, 1950, p. 27-29, 31-32. Based on paper by Jerard M. Pederson.
Method offered for rating engines by critical element content to simplify achievement of "non-strategic" jets. The various high-temperature alloys are assigned alloy index numbers based on relative scarcity in the U. S. of the constituents. The same system is applied to engine components to obtain overall index numbers indicating relative scarcity of the metals used. Shows how the system may be used to select substitute metals and to redesign with availability of materials in mind.
(T25, SG-h)

243-T. Research Pays Off on Vacuum Cleaner Production. *Production Engineering & Management,* v. 25, May 1950, p. 57-64.
Miscellaneous equipment and procedures in production of Hoover vacuum cleaners. Includes foundry practice, presswork, machining, and finishing (painting and plating).
(T10, E general, G1, G17, L17, L26)

244-T. Aluminum Holds Protect Fish. H. C. Plummer. *Food Industries,* v. 22, May 1950, p. 121.
New type vessel compartmented and completely lined with aluminum. The lining material is 3/16-in. Alcan 57-S sheets. Pound-boards, shelves, and fish-room stanchions are 51-ST Al extrusions. (T22, Al)

245-T. Metals for Gas Turbines. Norman L. Mochel. *American Society of Mechanical Engineers,* Paper No. 49-A-85, Dec. 1949, 13 pages.
Reviews present situation for long-life gas turbines. Use of Al, Ti, Cr, Mo, W, and Ni alloys, as well as stainless and alloy steels for hot parts. 14 ref.
(T25, SG-h, Al, Cr, Mo, Ni, W, SS, AY)

246-T. Aluminum in Industry. J. J. Brown. *Canadian Metals,* v. 13, Apr. 1950, p. 6-8, 45.

Applications, principally as a material of construction. (T26, T5, Al)

247-T. Cold Forming Tools; Choice of Composition and Heat Treatment. *Iron and Steel,* v. 23, Apr. 1950, p. 141-144.

Carbon and alloy toolsteel compositions are discussed.
(T6, J general, TS)

248-T. Laws of Heating and Cooling of a Furnace With Constant Heat Supply. (In French.) Gustave Ribaud. *Comptes Rendus* (France), v. 230, Mar. 13, 1950, p. 1011-1015.

Analyzes the above for an empty furnace and for a charged furnace. Simplified formulas are proposed for calculation of heating and cooling in both cases. Formulas are interpreted for different values of variables. (T5)

249-T. NACA Studies Ceramals for Turbine Blading. *SAE Journal,* v. 58, May 1950, p. 40-42; discussion, p. 42. Based on "Review of NACA Research on Materials for Gas-Turbine Blades", by G. Mervin Ault and G. C. Deutsch. (To be printed in full in *SAE Quarterly Transactions.*)

Discusses primarily boron and titanium carbide types, including effects of addition of Co, W, and Mo to the latter. Graphs show trends of transverse rupture strength with temperature and composition.
(T25, Q27, B, Ti, SG-h)

250-T. How To Put Brass in a Band. Ray Fisher. *American Machinist,* v. 94, May 15, 1950, p. 89-93.

Production of band instruments by C. G. Conn, Ltd. Forming, bending, spinning, joining, heat treating, and finishing must be done with precision if the instrument is to pass the final electronic tone test. Although 654 raw materials are required, sheet brass is the principal one. (T9, G general, Cu)

251-T. High-Pressure Vessels in Coal-Hydrogenation Service. J. T. Donovan, M. Josenhans, and J. A. Markovits. *Transactions of the American Society of Mechanical Engineers,* v. 72, May 1950, p. 357-363.

The converters must resist 10,000 psi. and 1000° F., also hydrogen attack and H_2S corrosion. The three different designs proposed by American manufacturers and the vessels accepted for the Bureau of Mines plant. The German spirally wound construction and its expected advantages. Materials include carbon steel and various alloy and stainless steels.
(T29, T26, CN, AY, SS, SG-h)

252-T. High-Pressure (10,300 Psi) Piping, Flanged Joints, Fittings, and Valves for Coal-Hydrogenation Service. J. H. Sandaker, J. A. Markovits, and K. B. Bredtschneider. *Transactions of the American Society of Mechanical Engineers,* v. 72, May 1950, p. 365-372.

The piping components used in the coal-hydrogenation process and some factors considered in design. A short discourse on future design for commercial-scale plants. Carbon, alloy, and stainless steels used in various locations.
(T29, CN, AY, SS, SG-h)

253-T. Metallurgical and Fabrication Considerations in the Coal-Hydrogenation Demonstration Plant Construction. B. H. Leonard, Jr., G. D. Gardner, and J. A. Markovits. *Transactions of the American Society of Mechanical Engineers,* v. 72, May 1950, p. 379-383.

Special equipment, special steels, and heavy wall thicknesses were required. Various metallurgical and fabrication problems encountered included hydrogen attack, high-temperature strength, welding, machining, choice of materials, defects, etc. Carbon, alloy, and stainless steels are used in various locations.
(T29, CN, AY, SS, SG-h)

254-T. Many New Applications for Powdered Metals. Joseph Geschelin. *Automotive Industries,* v. 102, May 15, 1950, p. 36-37, 118, 120, 122.

Fourteen manufacturers are listed together with specific powdered-metal products made by each.
(T general, H general)

255-T. For Trim Appearance. *Die Castings,* v. 8, May 1950, p. 21, 65-66.

Combined lawn edger and hedge trimmer with one-piece Al-alloy, die-cast housing, Cr steel cams, Ni steel gears, and toolsteel blades.
(T10, Al, AY, TS)

256-T. Handy Around the House. *Die Castings,* v. 8, May 1950, p. 22-24.

Miscellaneous household-appliance parts and gadgets die cast in Al or Zn alloy. (T10, Al, Zn)

257-T. Die Cast Accessories Increase Uses for Standard Appliances. *Die Castings,* v. 8, May 1950, p. 24.

Al die-cast household butter-churn lid. (T10, Al)

258-T. Alloy Stability Needed for Timing Controls. *Die Castings,* v. 8, May 1950, p. 25-26, 66-67.

Zn-alloy die castings in instru-

ments for control, cycling, switching, and protection of machine operations. (T8, Zn)

259-T. Cost of Labor and Materials Reduced 20 Percent. *Die Castings,* v. 8, May 1950, p. 29, 68-69.

How change from sand-cast to die-cast Al alloy brackets for fractional horsepower motor reduced production costs by eliminating eight machines and four machining operations. Reduction in weight without loss of strength and greater ease in assembling were also obtained. (T1, Al)

260-T. Aimed for Profits. *Die Castings,* v. 8, May 1950, p. 30-32, 70.

Use of Zn die-cast parts for target pistols used in connection with an amusement-park game. Also use in coin-operated mechanisms. (T10, Zn)

261-T. Fewer Parts; Stronger Structure. *Die Castings,* v. 8, May 1950, p. 33-35, 71.

Use of Zn-alloy die castings in Rex-O-Graph fluid duplicator. (T10, Zn)

262-T. Printing Surface of Check Protector Has Special Dot Pattern. *Die Castings,* v. 8, May 1950, p. 36-38.

Method of production of die-cast Zn type with recessed dots. The type is cast along the edge of a curved steel segment. The dots must mesh exactly with cones on a brass matrix during the check-writing operation. The machine also includes other Zn die-cast parts. (T10, E13, Zn)

263-T. Use of Die Castings in an Automatic Record Changer. *Machinery* (London), v. 76, Apr. 27, 1950, p. 613. Use of Zn-base alloys. (T10, Zn)

264-T. Problems in the Use of Magnesium Alloys for Optical Instruments. (In German.) E. Neukirch. *Metall,* v. 4, Apr. 1950, p. 142-144.

The requirements of Mg alloys, such as degree of purity, permissible kinds and amounts of alloying elements, etc., for uses in optical instruments. Includes a discussion on the Heliarc-welding process and surface protection. 18 ref. (T8, K1, L general, Mg)

265-T. (Book) Varnish Manufacture and Plant. H. W. Chatfield. 429 pages. 1949. Leonard Hill, Ltd., 17 Stratford Place, London W.1, England.

Materials of plant construction and design of varnish-making plant, from the chemical engineering point of view. Chapter 2 outlines physical, mechanical, and chemical properties of cast irons, stainless and alloy steels, Ni alloys, Al, Cu, Sn, and Pb used. (T29, SG-g)

266-T. Materials at Work. *Materials & Methods,* v. 31, May 1950, p. 76-78.

Briefly describes and illustrates the following: Ni-clad copper wire; vanadium and amberyl screwdriver; Alnico grate; carbide-faced pulverizer pegs. (T general)

267-T. Redesigning in Magnesium Promotes Economy, Structural Simplicity, Better Service. J. P. Donald Garges. *Modern Metals,* v. 6, May 1950, p. 17-19.

Redesign of F-80 fighter wing in Mg. The wing was originally of conventional Al construction involving a multitude of parts and fastenings. The new Mg wing contains only 31% as many parts and 38% as many fastenings. (T24, Mg)

268-T. Bucks County Enterprises. *Modern Metals,* v. 6, May 1950, p. 21-22.

Above firm makes Al materials-handling equipment. (T5, Al)

269-T. Electrical Substations: a Growing Use for Structural Aluminum. A. M. Baker. *Modern Metals,* v. 6, May 1950, p. 23-24. (T1, Al)

270-T. Building Boom Boosts Use of Aluminum Extrusions. F. L. Church. *Modern Metals,* v. 6, May 1950, p. 26-28.

Various types of structural extrusions and how they fit into the structure of buildings. (T26, Al)

271-T. Castings Cut Costs; Aluminum Serves as Economizer in Modernair Pressure Systems. John E. Goldring. *Modern Metals,* v. 6, May 1950, p. 38-40. (T27, Al)

272-T. Stainless-Clad Steel for Digesters. W. H. Funk and E. H. Wyche. *Paper Trade Journal,* v. 130, May 18, 1950, p. 23-24, 26, 28, 30.

Advantages to be gained by using stainless-clad steel digesters for sulfate and sulfite pulping. Selection and application of the proper types of stainless-clad. (T29, SS)

273-T. Agricultural Implements. *Iron and Steel,* v. 23, May 1950, p. 147-150.

Various examples of weight saving by choice of suitable steels. (T3, ST)

274-T. Ski-Jumping on Hampstead Heath. *Light Metals,* v. 13, May 1950, p. 227-229.

Use of Al alloy tubing in structure built for ski-jumping near London where the usual hills are unavailable. (T10, Al)

275-T. Pirelli Aluminum Sheathed Cable. *Light Metals,* v. 13, May 1950, p. 234-235.

Fabrication by cold pressure welding. (T1, K5, Al)

276-T. Aluminum at the British Industries Fair—1950. *Light Metals,* v. 13, May 1950, p. 243-291.

Comprehensive classified survey, including company names and addresses. (T general, Al)

277-T. Plant for Peat Winning. *Light Metals,* v. 13, May 1950, p. 292-294.

Various applications of Al and alloys in equipment of peat-recovery industry in Ireland. (T29, Al)

278-T. Flashings in Super-Pure Aluminium. *Light Metals,* v. 13, May 1950, p. 295-297.

In contrast with unalloyed Al of normal commercial grades, superpure Al is characterized by its resistance to work hardening; specialized forming operations are thereby simplified. (T26, G general, Al)

279-T. The "Bourse-O.T.H." Method for Mass Construction Based on Utilization of Cast "Alpax" Forms for Concrete Pouring. (In French.) *Revue de l'Aluminium,* v. 27, Mar. 1950, p. 103-105.

Special cast Al-alloy concrete-pouring forms designed for use in mass production of dwelling units and other buildings. (T26, Al)

280-T. Electric Generators of High Efficiency and Light Weight. (In French.) Henry Lanoy. *Revue de l'Aluminium,* v. 27, Mar. 1950, p. 109-112.

Generators designed for aircraft use. Extensive use is made of light and extra-light alloy parts. (T1, T24, Al, Mg)

281-T. Magnesium Reduces Worker Fatigue. *Magazine of Magnesium,* May 1950, p. 2-5.

Miscellaneous applications to metalworking tools, materials handling equipment and various other products in various industries. (T5, Mg)

282-T. Reynold's Phoenix Plant Shows New Integrally Stiffened Skins. *Western Metals,* v. 8, May 1950, p. 23.

Miscellaneous applications. (T26, Al)

283-T. L & N's "1970" Leads New Motive Power to Increased Tonnage Ratings. *Vancoram Review,* v. 6, No. 3, 1950, p. 6-8.

Emphasizes applications of vanadium steel in new locomotive. (T23, AY)

284-T. Vanadium Data Sheet: Vanadium Steels and Irons for Diesel Application. *Vancoram Review,* v. 6, No. 3, 1950, p. 12-17.

Table gives applications, designations, compositions, heat treatments, mechanical properties and remarks for various steel and iron compositions. (T23, AY, CI)

285-T. A New Chromium Long-Life Litho Plate. D. N. Adams. *National Lithographer,* v. 57, May 1950, p. 32-33, 71, 73, 79.

Reviews some of the pertinent chemical properties of the metals which alone or as alloys make up most polymetallic plates. Development of a deep-etch plate utilizing Cr in the nonworking areas and hydrophobic organic coatings in the working areas. Development of an etching solution included evaluation of Au, Ir, Pd, Pt, and Ru as catalytic agents for release of hydrogen on contact of HCl with Cr. (T9, P13, Cr)

286-T. Study of Core Wire for Electrodes. C. B. Voldrich, D. C. Martin, and P. J. Rieppel. *Welding Journal,* v. 29, June 1950, p. 265s-284s.

Influence of various types of core wire on the operating characteristics of welding electrodes and on strength, ductility, and soundness of weld metals. Core wire variables studied were type of steel (rimmed, capped, semikilled, killed), location of core wire in heat, chemical composition, and physical characteristics. (T5, ST)

287-T. Quality Control of Aircraft Sandwich Materials. Herbert B. Epstein. *Aero Digest,* v. 60, June 1950, p. 38-39, 100-101.

Various quality-control methods developed at Chance Vought Div. of United Aircraft Corp. to monitor the quality of their "Metalite"-bonded structures which consist of thin facings of high-strength Al alloy bonded to a relatively thick, lightweight balsa core. Its smoothness, high strength and light-weight properties give it advantages over conventional construction. T24, S general, K11, Al)

288-T. Rock Drilling With Tungsten Carbide Bits. J. H. Fulton, A. G. Douglass, and J. Beattie. *Canadian Mining and Metallurgical Bulletin,* v. 43, May 1950, p. 254-258; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 53, 1950, p. 169-173.

Methods used and results obtained in test work with smaller-bore, lighter-weight rock drills. (T28, W, C)

289-T. Metals as Money. Robert J. Edmunds. *Canadian Metals,* v. 13, May 1950, p. 43, 51.

Coinage in North America, and types and minting of coins from

Ag, Ni, and Cu alloys. Minting process from metal melting to coin storage. (T10, Ag, Cu, Ni)

290-T. Aluminum in the Film Industry. *Metal Industry,* v. 76, May 12, 1950, p. 386-387.

Miscellaneous applications. (T9, Al)

291-T. Seven Ways To Produce Turbine Blades. *SAE Journal,* v. 58, June 1950, p. 48-52. Based on "Blade Design and Production", by A. T. Colwell, K. M. Bartlett, and R. E. Cummings.

Processes are forging, lost wax, machining, fabrication (sheet-stock forming), powder metallurgy, rolling, and mercast (precision casting with frozen mercury patterns). Materials mentioned are iron and Type 403 stainless. Illustrated. (T25, E15, F22, F23, G1, G17, H general, CI, SS)

292-T. Welded Alloy Steel Tank Operates at −300° F. *Inco,* v. 24, Spring 1950, p. 10, 29.

Welded tank constructed of AISI 2800 can handle working pressures up to 600 psi. or full vacuum, and withstand impact at this low temperature. (T26, Q6, AY)

293-T. Metals for Gas Turbines. Norman L. Mochel. *Mechanical Engineering,* v. 72, June 1950, p. 462-466.

Previously abstracted from *American Society of Mechanical Engineers,* Paper No. 49-A-85. See item 245-T, 1950. (T25, SG-h)

294-T. Australia's Welded Highway Bridges. V. Karmalsky. *Engineering News-Record,* v. 144, June 1, 1950, p. 39-41.

Welded shop fabrication and riveted field erection. Includes mechanical properties of steel. (T26, K general, Q general, ST)

295-T. Proper Care for Hollow Steel Will Cut Your Drilling Costs. W. H. McCormick and C. W. Darby. *Engineering and Mining Journal,* v. 151, June 1950, p. 74-76.

Proper drilling, forging, and annealing techniques to cut failure in drill tools. (T6, F22, J23, TS)

296-T. Aluminum Sheathed Impregnated Pressure Cable. *Machinery Lloyd* (Overseas Edition), v. 22, May 13, 1950, p. 99. (T1, Al)

297-T. Review of Metallurgy. *Mining Journal* (Annual Review Number), May 1950, p. 85.

Work of past year on new uses of various metals in the mining industry. (T28)

298-T. Magnesium in Navy Planes. J. E. Sullivan. *Journal of the American Society of Naval Engineers,* v. 62, May 1950, p. 433-438. Reprinted from *Aero Digest,* Jan. 1950; and condensed from *Magazine of Magnesium,* Aug. 1949. (T24, Mg)

299-T. Metallurgical Problems in Oil Well Drilling and Petroleum Production. George W. Whitney and Morton Spar. *Metal Progress,* v. 57, June 1950, p. 755-760.

General discussion as applied to derrick equipment, power transmission, sucker rods, and pumps. Largely limited to ferrous alloys and their resistances to mechanical and corrosive effects. (T28, Q general, R general, Fe)

300-T. Stainless Steel for Television. Arnold S. Rose. *Metal Progress,* v. 57, June 1950, p. 761-764.

Television picture tubes are made of ferritic stainless steel, to which is sealed the glass face plate. Expansion characteristics of the steel are important in making the glass-to-metal seal. Recent changes in alloy composition have enabled a 17% Cr iron to be substituted for the more costly 28% Cr alloy used previously. Significance of the austenite transformation in connection with expansion characteristics. (T1, K11, P11, SS)

301-T. Selecting Steels and Heat Treatments for Automotive Gears. V. E. Hense, H. H. Miller, and R. B. Schenck. *Materials & Methods,* v. 31, June 1950, p. 57-60.

Factors involved, and recommendations. (T7, T21, J general, ST)

302-T. Gray Iron Preferred for Large, Heavy Duty Crankshafts. Alexander Finlayson. *Materials & Methods,* v. 31, June 1950, p. 69-71.

Low notch sensitivity, high damping, and improved strength properties of properly processed and inoculated gray iron suit it to critical diesel-engine components. (T25, Q23, CI)

303-T. Materials at Work. *Materials & Methods,* v. 31, June 1950, p. 72-74.

Includes: Brazed cam formed from stamped copper-steel laminations; Mg-alloy chain saw; inert-gas-shielded arc welding for production of stainless steel tubing from coiled strip; steel wire brushes for removal of secondary mill scale; Al ceiling grid; and phenolic switch base. (T general, Mg, Al, ST, SS)

304-T. Modern Foundry Methods. *American Foundryman,* v. 17, June 1950, p. 36-37.

Redesign of a trailer hitch to take

advantage of cost reduction and improved appearance inherent in castings. (T21, E general, CI)

305-T. Diesel Bearings. *Western Machinery and Steel World,* v. 41, June 1950, p. 78-80.

Casting and machining of large bearings of steel faced with Cu-Pb alloy and other bearing metals. (T7, E general, G17, SG-c)

306-T. Some Factors in Bi-Metal Lithography. Marvin C. Rogers. *Modern Lithography,* v. 18, June 1950, p. 45-48.

Problems involved in lithography using various dissimilar metal combinations for the printing and water-carrying surfaces. Wettabilities of the different metals, in relation to performance in use. (T9, P10)

307-T. Aluminum Die Castings Cut Costs, Reduce Weight, Improve Performance of Simplex Servi-Cycle. *Modern Metals,* v. 6, June 1950, p. 17-18.

Application to lightweight motorcycles. (T10, Al)

308-T. The Booming Furniture Market Pioneer Companies Open New Field for Aluminum. *Modern Metals,* v. 6, June 1950, p. 20-21.

Applications of Al to the above. (T10, Al)

309-T. Cold to the Last Drop. *Modern Metals,* v. 6, June 1950, p. 22.

"Frigice" is a new cup-like device of aluminum which includes ice compartment to keep drinks ice-cold without diluting them. (T10, Al)

310-T. Alcoa's Davenport Plant; World's Largest Aluminum Sheet and Plate Rolling Mill. *Modern Metals,* v. 6, June 1950, p. 30-31.

Plant includes many unusual and spectacular uses of Al in building construction. (T26, F23, Al)

311-T. Lead as a Construction Material in Chemical Processes. F. S. McCarthy. *Canadian Chemistry and Process Industries,* v. 34, June 1950, p. 474-477.

Relative merits of lead in sulfuric acid manufacture and processing. Dependence of chemical industry on lead despite its well-known structural defects. (T29, Pb)

312-T. Sales Opportunities in Perforated Metals. *Sheet Metal Worker,* v. 41, June 1950, p. 41-44.

Wide variety of applications in production and consumer goods. (T general, G3)

313-T. Modern Electrode Production. *Welding,* v. 18, June 1950, p. 248-254.

Equipment and procedures of British firm. Includes blending of powders for coatings, application of the coatings, drying, and testing. (T5)

314-T. Forgings. *British Steelmaker,* v. 16, June 1950, p. 316-320, 323. (Extracted from "British Standards for Steel and Steel Products—B.S. Handbook No. 10", 1949 Edition.)

Some of the more important uses of steel forgings in the engineering industry. (T general, F22, ST)

315-T. Air Force Planning to Build All-Magnesium Airplane. *CADO Technical Data Digest,* v. 15, July 1, 1950, p. 7.

Briefly describes and illustrates plane to be made entirely of Mg-Zr alloy. (T24, Mg)

316-T. Dynaflow Brake Band Simplified and Improved. Joseph Geschelin. *Automotive Industries,* v. 103, July 1, 1950, p. 42-44, 74.

Improved procedures and equipment for production from cold rolled SAE 950 N-A-X steel strip. Roll forming, projection welding, press forming, brazing, sawing, embossing, machining, shot peening, and broaching. (T21, G general, K3, K8, AY)

317-T. Aluminum Pipe Lines. W. B. Moore. *Welding Engineer,* v. 35, July 1950, p. 26-29.

Installation for gas and oil service, including arc welding and protective-coating application. Advantages, including cost savings. (T28, K1, L general, Al)

318-T. Experience in the Use of Copper Tubing for Mains and Services. S. A. Bradfield. *American Gas Association, Proceedings,* v. 31, 1949, p. 613-622.

Installation of copper gas mains and general service procedure. (T4, Cu)

319-T. Diaphragm Valve of New Design. *Light Metals,* v. 13, June 1950, p. 334-335.

Valve recommended for use in pipelines carrying liquids such as fruit juices, milk, etc., where glass-lined or bronze valves are commonly used. Includes long list of fluids for which Al valve bodies are suitable, also a shorter list for which Al is not recommended. (T29, R5, Al)

320-T. Light Alloy Aids Light Control. *Light Metals,* v. 13, June 1950, p. 342-343.

Aluminum venetian blinds and new type of light diffuser made of continuous strips of thin Al and suspended in panels over the whole ceiling and under the lighting units. (T10, Al)

321-T. Furnace Design and Practice. R. J. Sarjant. *Institution of Mechanical Engineers, Proceedings,* v. 162, No. 1, 1950, p. 75-85; discussion, p. 86-92.

See abstract from *Engineer,* item 40-T, 1950. (T5)

322-T. Use of Metallic Crucibles for Melting Aluminum Alloys. (In French.) Jean Duport. *Fonderie,* Apr. 1950, p. 2017-2023.

In certain cases the use of metallic crucibles is quite advantageous. Various factors involved including advantages and disadvantages, choice of type of alloy for the crucibles (various ferrous alloys are described), Al alloys which can be melted in metal crucibles, crucible design and dimensions (diagrams), effect of method of heating and necessary precautions. (T5, E10, Fe, Al)

323-T. Petroleum: Raw Material of Modern Chemistry. (In French). Maurice Victor. *Revue de l'Aluminium,* v. 27, Apr. 1950, p. 145-151.

British petroleum refinery with emphasis on extensive use of Al and its alloys. (T29, Al)

324-T. Soft Steel and Cast Iron for Rolling-Mill Bearings. (In Czech.) Josef Teindl. *Hutnické Listy,* v. 5, Mar. 1950, p. 97-101.

Possibility of using various types instead of bronze. Bearing details and plant experiments. 12 ref. (T5, CN, CI)

325-T. Brake Drum Materials. Fred J. Walls. *Foundry,* v. 78, July 1950, p. 68-69, 182-184, 186.

Some of the requirements of a suitable brake drum material and metallurgical factors involved in its selection. Property data on "pure" commercial metals and cast alloys are charted, tabulated, and discussed. (To be continued.) (T21, T24, P general, Q9)

326-T. Heavy Duty Bearing Retainers. *Die Casting,* v. 8, July 1950, p. 23-24.

Bearing housings of die-cast Zn are used to support shafts for conveyor-belt idler pulleys in trench-digging machine. (T4, Zn)

327-T. Work Accomplished. *Die Casting,* v. 8, July 1950, p. 26, 58-59.

How flexibility of design permitted by usage of Al and Zn die castings allowed Service Recorder Co. to incorporate new features in its movement-recording devices. (T8, Al, Zn)

328-T. Put It in Writing. *Die Casting,* v. 8, July 1950, p. 28-30.

Use of Al alloy die castings in instruments manufactured by Tel-Autograph Corp., for immediate transmission of handwritten messages from one location to another. (T8, Al)

329-T. For the Best Service Garage Instruments Make Use of Aluminum, Zinc, and Lead Die Castings. *Die Casting,* v. 8, July 1950, p. 32-34, 36.

Automotive testing apparatus manufactured by Heyer Industries. (T8, Al, Zn, Pb)

330-T. Alloy Steel Churn Drill Bits Prove Superior in Tough Ground. J. H. Dewey and T. N. Armstrong. *Engineering and Mining Journal,* v. 151, July 1950, p. 64-66.

Compares performance of carbon steel and SAE 4340 in drilling various types of rock. (T29, CN, AY)

331-T. There's Sunshine in the Subway Now! *Steel Horizons,* v. 12, Summer 1950, p. 8-9.

Stainless-steel subway cars for New York City. (T23, SS)

332-T. Applications of Light-Metal Castings. (In German.) A. Buckeley. *Neue Giesserei,* v. 37 (new ser., v. 3), May 18, 1950, p. 190-194.

Numerous ways of using cast light metals (Al alloys) for machine and equipment parts. 11 ref. (T general, E general, Al)

333-T. Economics of Lower Alloy Steels for High Quality Gears. V. E. Hense, H. H. Miller, and R. B. Schenck. *Automotive Industries,* v. 103, July 15, 1950, p. 37, 78.

See abstract of "Selecting Steels and Heat Treatments for Automotive Gears," *Materials & Methods,* item 301-T, 1950. (T7, T21, J general, ST)

334-T. Aluminum Tubing for Better Paper Cores. N. J. Spelson and F. A. Rappleyea. *Paper Mill News,* v. 73, July 15, 1950, p. 86.

Development of special Al alloy for cores on which large rolls of paper are wound in the mills. Comparative mechanical properties. (T29, Al)

335-T. Brake Drum Materials. Fred J. Walls. *SAE Quarterly Transactions,* v. 4, July 1950, p. 368-380; discussion, p. 380.

Previously abstracted from *Foundry.* See item 325-T, 1950. (T21, T24, P general, Q9)

336-T. Review of NACA Research on Materials for Gas Turbine Blades. G. Mervin Ault and G. C. Deutsch. *SAE Quarterly Transactions,* v. 4, July 1950, p. 398-409; discussion, p. 409.

See abstract of condensed version in *SAE Journal,* item 249-T, 1950. (T25, Q27, B, Ti, SG-h)

337-T. Stainless Passenger Equipment Untouched by 13 Years. *Metal Progress,* v. 58, July 1950, p. 69-70.

Inspection of Burlington Road's Denver Zephyr, the pioneering high-speed streamliner made of stainless steel trusses and sheathing, shows it to be absolutely sound after 4,500,000 miles. (T23, SS)

338-T. Heating Diesel-Powered Passenger Trains. E. A. Russell. *Metal Progress,* v. 58, July 1950, p. 71-72.

Steam generator for diesel train uses a wide variety of metals and alloys. (T23)

339-T. Good and Bad Points of Magnesium Plates Revealed Through Two Years of Experience. Ranald Savery. *Inland Printer,* v. 125, July 1950, p. 27-30.

Results of a survey of user opinion concerning photo-engraved printing plates made of the Mg alloys Dowmetal and Zomag. (T9, Mg)

340-T. Zirconium as a Material for Fractional Weights. William M. Thornton, Jr., and Edward S. Hauber. *Journal of the Franklin Institute,* v. 250, July 1950, p. 39-44.

Potential advantages. Preliminary test data show reliability. 12 ref. (T8, Zr)

341-T. Big Business Built in Five Years: Kool-Vent Aluminum Awnings. Fred L. Church. *Modern Metals,* v. 6, July 1950, p. 20-23.

Production of awnings. Includes forming of coiled strip, and finishing operations. (T10, G1, L general, Al)

342-T. Aluminum Doors Added to Robbins Line. *Modern Metals,* v. 6, July 1950, p. 23.

Al sheets are attached to wooden cores. Metal surfaces are decorated in a variety of ways. (T26, Al)

343-T. Anodized Belts and Jewelry Highlight Profitable New Field for Aluminum. *Modern Metals,* v. 6, July 1950, p. 32.

(T10, Al)

344-T. Recent Industrial Gas Installations. Part II. W. A. Darrah. *Industrial Gas,* v. 29, July 1950, p. 6-9, 25, 27.

A variety of controlled-atmosphere furnaces for metallurgical and non-metallurgical processing. (T5)

345-T. Materials at Work. *Materials & Methods,* v. 32, July 1950, p. 68-70.

Includes the following: aluminum boat, lightweight-alloy generator, stainless steel compressor blades, all-aluminum fryer. (T general, Al, SS)

346-T. Zirconium in the Operating Room. J. I. Bates. *Foote Prints,* v. 22, no. 1, 1950, p. 5-9.

Comparative mechanical properties and corrosion resistance of Zr, Ta, and 18-8-SMO stainless. Outlines various surgical applications. (T10, Zr, Ta, SS)

347-T. Acicular Cast Iron in Textile Machinery. *Nickel Bulletin,* v. 23, May 1950, p. 78-80.

Construction of automatic looms, especially the picking mechanism. Ni-Mo acicular cast iron has been in use by a Belgian firm for some time for the picking shaft and components. As a result service failures have been practically eliminated. (T29, CI)

348-T. Lighter and Brighter Metals Find Increasing Application for Architectural Metalwork. Charles R. Fleishman. *Western Metals,* v. 8, July 1950, p. 17-18.

Architectural uses of Al, stainless steel, bronze, and nickel silver. (T26, Al, SS, Cu)

349-T. Recuperators for Small Industrial Furnaces. W. Trinks. *Industrial Heating,* v. 17, July 1950, p. 1182, 1184, 1186.

The "Thermobloc" recuperator developed in England during World War II was designed to produce a high flame temperature from lean gases, not for fuel economy. (T5)

350-T. Lightweight Turbine Generator Rotors. T. De Koning. *Electrical Engineering,* v. 69, Aug. 1950, p. 694.

Al and Mg alloys are used since they have high strength in relation to weight as well as good heat and electrical conductivity, weldability, damping capacity, and protective surfaces. (T25, Al, Mg)

351-T. Waldean Cow House. *Light Metals,* v. 13, July 1950, p. 386-387.

Use of Al alloy panels and structural members. (T26, Al)

352-T. The Telescopic Gangway. *Light Metals,* v. 13, July 1950, p. 388-391; *Metal Industry,* v. 77, July 7, 1950, p. 7-8.

Use of Al alloys in docking facilities for the "Queen" vessels of the Cunard White Star Line. (T22, Al)

353-T. Dome of Discovery. *Light Metals,* v. 13, July 1950, p. 392-394; *Engineering,* v. 170, July 7, 1950, p. 10-11.

Dome now under construction is said to be the largest dome in the world and by far the largest single structure ever to be built of aluminum. (T26, Al)

354-T. Aluminium in Stagecraft. *Light Metals,* v. 13, July 1950, p. 403-405.

Various applications to stage settings. (T9, Al)

355-T. Chelsea Show, 1950. *Light Metals,* v. 13, July 1950, p. 406-409.

Use of Al alloys in greenhouse construction. (T26, Al)

356-T. Aluminium and Lighting. J. W. Morse. *Light Metals,* v. 13, July 1950, p. 357-361.

Various applications. (T1, Al)

357-T. Light-Alloy Barge. *Light Metals,* v. 13, July 1950, p. 374-376.

Barge in use on the London river. (T22, Al)

358-T. Hoover F.H.P. Motor; Design for Production in Aluminium. *Light Metals,* v. 13, July 1950, p. 377-379.

Fractional horse-power motors made by Hoover, Ltd., in England. (T1, Al)

359-T. Metal Crucibles for Melting Aluminium Alloys. Jean Duport. *Foundry Trade Journal,* v. 89, July 13, 1950, p. 45-48. Translated and condensed.

Previously abstracted from *Fonderie.* See item 322-T, 1950. (T5, E10, Fe, Al)

360-T. Ductile Iron for Heavy Machinery. C. D. Galloway, III. *Iron Age,* v. 166, Aug. 3, 1950, p. 75-78.

Ductile iron is being used for machinery castings weighing up to 30 tons. Composition and heat treatment are keys to the broad range of properties obtainable. Oscillograph recordings of special vibration dampening tests illustrate how this versatile material fills the gap between cast iron and cast steel. Patterns built for cast iron can be used. (T5, Q8, CI)

361-T. Where There's Smoke. *Die Castings,* v. 8, Aug. 1950, p. 19-20, 55-56.

Floor-stand ash trays are made of Al and Zn die castings with an Al-tube connecting the base and the ash-tray proper. (T10, Al, Zn)

362-T. Six-Shot Mechanism Uses Built-In Cams and Detents. *Die Castings,* v. 8, Aug. 1950, p. 23, 61.

Use of Zn and brass die castings above mechanism on target-model air pistol. (T2, Zn)

363-T. "Home Made" Ball Bearing With Die Cast Race. *Die Castings,* v. 8, Aug. 1950, p. 24-27, 55.

Bearing arrangement made up of a steel band and hardened, ground-steel balls mounted in a die-cast Al base not only simplifies design, but also eliminates need for expensive bearings in television-antenna rotator and holder. (T7, Al)

364-T. "Filling the Bill". *Die Castings,* v. 8, Aug. 1950, p. 28-30, 60.

Use of Zn and brass die castings in gasoline-hose nozzle valves resulted in substantial cost savings. (T7, Zn, Cu)

365-T. Exposure to Salt Water Proves Life of Die Cast Aluminum. *Die Castings,* v. 8, Aug. 1950, p. 32-34, 62.

Use of die-cast Al for cabin-cruiser fittings. Stainless steel trim also gave satisfactory service. Cr plated, sand-cast brass had given unsatisfactory results. (T6, R4, Al, SS)

366-T. Working Surfaces for Radiochemical Laboratories; Glass, Stainless Steel, and Lead. Paul C. Tompkins and Oscar M. Bizzell. *Industrial and Engineering Chemistry,* v. 42, Aug. 1950, p. 1469-1475.

A systematic attempt was made to develop simple tests which permit comparisons between surfaces, decontamination reagents, and contaminating conditions. The data are reported in terms of two newly defined quantities called decontamination index and spill index. Conclusions regarding suitability of glass, stainless steel, and lead for radiochemical laboratory surfaces are drawn, and a schedule for safe operation at various levels of activity is presented. (T29, S19, SS, Pb)

367-T. Aircraft Exhaust Valves & Seats. A. L. Pomeroy. *SAE Journal,* v. 58, Aug. 1950, p. 33-34.

Summarizes proceedings of 1950 SAE Summer Meeting round-table discussion. Problems of design, construction materials, corrosion, sodium cooling, coatings, etc. (T7, T24)

368-T. Jets Test Designers' and Metallurgists' Ingenuity. R. B. Johnson. *Iron Age,* v. 166, Aug. 10, 1950, p. 73-78.

Problems involved in design and choice of materials for jet engines. Mechanical and physical property data on alloys and components. Service failures. (T25, Q general, P general, S21, SG-h)

369-T. An Analysis of the Effect of the Life of Hardware Items of Overhead Pole Line Structures on Overall Annual Costs. Part I. Theoretical Analysis. Part II. Consideration of Methods To Extend the Life Expectancy of Mild Steel Hardware. Part III. Analysis of Cost of Applying Design Coordination Improvement to an Uncoordinated System. E. W. Oestereich. *Edison Electric Institute Bul-*

letin, v. 18, Aug. 1950, p. 307-316, 319.
Economic and technological analysis. Part II shows corrosion resistance and service life of various metallic coatings on steel. Relative costs of extending life expectancy of a ⅝-in. bolt, using various methods. (T1, L general, A4)

370-T. Brake Drum Materials. (Concluded.) Fred J. Walls. *Foundry,* v. 78, Aug. 1950, p. 82-84, 118-119.
Some of the experiences of brake-drum manufacturers with various designs and metal compositions. Advantages and disadvantages of various gray-iron compositions for different types of drums.
(T21, T24, Q9, CI)

371-T. Cast Heat Resistant Alloy Extends Quenched Carburizing Tray Life 80%. *Steel,* v. 127, Aug. 14, 1950, p. 105.
Use of specially modified alloys containing 35% Ni and 16% Cr or 38% Ni and 18% Cr gave 80% increase in service life over conventional alloys of the same base composition. Added elements are not disclosed. (T5, J28, SG-h)

372-T. Die Castings Simplify Meter Design. *Product Engineering,* v. 21, Aug. 1950, p. 103.
Use of nine Zn die castings in parking meter. (T8, Zn)

373-T. Stainless Steel Valve Meters Mixed Flow. *Product Engineering,* v. 21, Aug. 1950, p. 106-107.
Equipment used on beverage dispenser. (T7, SS)

374-T. Canadians Build World's First Aluminum Arch Bridge. C. J. Pimenoff. *Civil Engineering,* v. 20, Aug. 1950, p. 17-21.
Special techniques developed for fabrication and erection to meet characteristics peculiar to high-strength structural aluminum.
(T26, Al)

375-T. 61S Alloy Tubing for Hydraulic Pressure Systems. G. A. Fairbairn and J. J. Sloan. *Applied Hydraulics,* v. 3, Aug. 1950, p. 24-26.
(T4, Al)

376-T. Bearing Theory; Bearing Materials; Cold-Work-Hardened Tin Bronze LBz-4031. (Continued.) (In French and German.) Fr. Eckert. *Pro-Metal,* v. 3, June 1950, p. 649-653.
The principle of good lubrication and the general bearing properties of the most commonly used bronzes: LBz-4031 is claimed to consist of a pure solid-solution structure and to have, as a result, superior bearing properties. (T7, SG-c, Cu)

377-T. Commercial Uses of Magnesium in Germany. Part II. E. J. deRidder. *Modern Metals,* v. 6, July 1950, p. 27-30.
German experiments and commercial applications in buses, trucks, trailers, streetcars, and locomotives. (To be continued.)
(T21, T23, Al)

378-T. Practical Aspects of Surface Decontamination. P. C. Tompkins, O. M. Bizzell, and C. D. Watson. *Nucleonics,* v. 7, Aug. 1950, p. 42-54, 87.
See abstract of "Working Surfaces for Radiochemical Laboratories; Glass, Stainless Steel, and Lead; Paints, Plastics, and Floor Materials", *Industrial and Engineering Chemistry,* item 366-T, 1950.
(T29, S19, SS, Pb)

379-T. How the Use of Magnesium Extrusions Is Reducing Manufacturing Costs. *Magazine of Magnesium,* Aug. 1950, p. 8-11.
Varied examples. (T general, Mg)

380-T. Metallurgy for High-Temperature High-Sulfur Process Conditions. F. M. Fahrenwald. *Petroleum Engineer,* v. 22, Aug. 1950, p. C11-C14, C16.
The high-temperature steels, their properties, and their applications in petroleum refining. Limited to ferrous alloys containing over 14% Cr, with or without addition of Ni, and used primarily for corrosion resistance or heat resistance at temperatures of over 1000° F.
(T29, SS, SG-g, h)

381-T. Current Applications of Ductile Iron Castings. *Nickel Topics,* v. 3, July 1950, p. 6-7.
Miscellaneous applications.
(T general, CI)

382-T. Nickel Plating Makes Better Drums for Caustic Shipment. *Nickel Topics,* v. 3, July 1950, p. 9.
(T29, Ni)

383-T. 60,000,000 Sparks From Each Electrode. *Mechanical Topics,* v. 12, no. 3, [1950], p. 4.
Use of Ni-clad Cu wire for spark plug electrodes made it possible for the plugs to be used for 243,000 miles of flying in the engine of an Eastern Airlines airplane.
(T24, Ni, Cu)

384-T. Silver in Chemical Plant Construction; Some Modern Applications. *Chemical Age,* v. 63, Aug. 5, 1950, p. 196-198.
(T29, Ag)

385-T. Aluminium Composites in Architecture. Joseph B. Singer. *Light Metals,* v. 13, July 1950, p. 370-373.
First of series dealing with the nature and uses of light metal integrally associated with various nonmetallic materials in building con-

struction. Uses in combination with plastics. (To be continued.) (T26, Al)

386-T. Determining Total Water Content in Electrode Coverings. C. T. Gayley and W. H. Wooding. *Welding Journal,* v. 29, Aug. 1950, p. 629-635.

Improved method which utilizes an analytical absorption train in which the sweeping medium passes successively through a purifying and drying train, a combustion tube mounted in a high-temperature furnace, and finally through the absorption train. Using oxygen as a sweeping medium, various furnace temperatures were investigated to establish a satisfactory temperature for determining the total water content of several covering constituents and coverings of shielded metal-arc welding electrodes. (T5, 11)

387-T. Two Hospitals Feature Cast Aluminum Walls. *Modern Metals,* v. 6, Aug. 1950, p. 17-18.

(T26, Al)

388-T. Aluminum Castings Used in Highly Stressed Antenna Rotator. *Modern Metals,* v. 6, Aug. 1950, p. 20.

(T1, Al)

389-T. Aluminum Extrusions Provide Ideal Track for Rolling Doors. *Modern Metals,* v. 6, Aug. 1950, p. 32.

(T26, Al)

390-T. How To Get More Footage Out of Hollow Drill Steel. C. W. Darby and R. M. Simpson. *Mining Congress Journal,* v. 36, Aug. 1950, p. 74-78, 83.

Methods for reducing breakage. Improvement with the use of alloy steels and new forging and heat treating methods.

(T6, F22, J general, TS)

391-T. Aluminum Insulated Roofing for Farm Buildings. *Sheet Metal Worker,* v. 41, Aug. 1950, p. 35, 39.

An installation on a large poultry farm. Results of temperature studies in comparison with noninsulated chicken houses. (T26, Al)

392-T. Aluminium-Sheathed Co-Axial Cable. *Light Metals,* v. 13, Aug. 1950, p. 414-416.

Characteristics and nominal dimensions. (T1, Al)

393-T. Sugar Cane Punt. *Light Metals,* v. 13, Aug. 1950, p. 441-443.

Fabricated from an Al alloy. (T3, Al)

394-T. Aluminium Composites in Architecture. Joseph B. Singer. *Light Metals,* v. 13, Aug. 1950, p. 444-448.

Al in combination with wood, fibreboard, cork, steel, and fibreglass, glass, and bitumen. (T26, Al)

395-T. Cold Reduced Steel Gains Favor as Magnetic Core Material. Harry F. Shannon. *Steel,* v. 127, Aug. 28, 1950, p. 72-74, 84.

Improved punchability; magnetic properties equivalent to those of hot rolled sheets; and thinner, less abrasive surface oxides, which are some of the reasons electric-motor and dynamo manufacturers are using cold rolled Si-steel sheets for core material. (T1, P16, AY)

396-T. Die Castings Have Superior Electric Properties. *Die Castings,* v. 8, Sept. 1950, p. 31-32, 69.

How the electrical properties of Al, together with its advantage as a lightweight structural material, are employed by Superior Electric Co. in variable transformers for voltage regulation. (T1, Al)

397-T. Die Cast Aluminum Housings for These Drive-In Theater Speakers Made Possible a 6-Inch Cone for High Quality Sound Reproduction Without Bulkiness. *Die Castings,* v. 8, Sept. 1950, p. 33, 58-59.

(T1, Al)

398-T. Efficient Operation With Stainless Steels. *Paper Mill News,* v. 73, Aug. 19, 1950, p. 89-90.

Application in the pulp and paper industry. (T29, SS)

399-T. Steel Partitions Gain Acceptance. C. J. Nocar. *Iron Age,* v. 166, Sept. 7, 1950, p. 107-109.

Use of movable steel partitions that are only a fourth as heavy as masonry construction. Fabrication (rolling, welding, and finishing).

(T26, CN)

400-T. Fold-Away Magnesium Truck Dock for Confined Areas. John Milne. *Flow,* v. 5, Sept. 1950, p. 35.

Mg platform 7x14 ft. which is rolled back when not in use to facilitate traffic in a narrow alley. (T5, Mg)

401-T. Electric Machines of High Power-Weight Ratio. H. Lanoy. *Engineers' Digest,* v. 11, Aug. 1950, p. 276-277. Translated and condensed from the French.

Previously abstracted from *Revue de l'Aluminium.* See item 280-T, 1950. (T1, T24, Al, Mg)

402-T. Spoon and Fork Production; The Sheffield Works of Viners Ltd. *Metal Industry,* v. 77, Aug. 25, 1950, p. 119-122.

Miscellaneous procedures and equipment, including melting and casting, cold rolling, annealing, descaling, press operations, plating, and buffing. Two types of nickel silver are plated with Cr, Ni, or Ag. (T10, A5, Cu, Cr, Ni, Ag)

403-T. Aluminium-Alloy Support in Steep and Medium Formations. Werner Hoevels. *Colliery Guardian,* v. 181, Aug. 24, 1950, p. 215-217. Translated and condensed from *Glückauf,* v. 85, Dec. 17, 1949.

Use of Al as substitute for timber supports in German mines. (T28, Al)

404-T. British Buses and Australian Automobiles Using Light Alloy. (In French.) *Revue de l'Aluminium,* v. 27, June 1950, p. 234-235.

Use of Al alloys and cost savings because of weight reduction. (T21, Al)

405-T. Weldments or Castings: A Case of Good Judgment. M. R. Nelson. *Iron Age,* v. 166, Sept. 14, 1950, p. 98-100.

Use of castings replacing welded structures for worm gear drives, eccentric hubs, connecting rods and other parts. By using Meehanite castings with a yield point very near the breaking strength, stronger and cheaper parts were obtained. (T7, CI)

406-T. Metal Problems in the Container Field. Neil M. Waterbury. *Glass Industry,* v. 31, Sept. 1950, p. 453-454.

Previously abstracted from *Ceramic Industry.* See item 210-T, 1950. (T29)

407-T. Five Diesel Valve Troubles. What Causes Them; What Relieves Them. *SAE Journal,* v. 58, Sept. 1950, p. 58-63. Excerpts from "Valve Problems in Diesel Engines" by Vincent Ayres.

Breakage, seat wear, valveface guttering, stem and guide wear, and sticking. Fundamental causes, including design, materials of construction, fuels, and lubricants. (T7, Q9, AY)

408-T. Outstanding Applications of Aluminium Alloys. *Metallurgia,* v. 42, Aug. 1950, p. 116-119.

Three recent examples (two in structural work and one in a semi-trailer unit.) (T26, T21, Al)

409-T. Steels for Tapered Roller Bearings; Factors Affecting Manufacture and Service. J. H. Evans. *Metallurgia,* v. 42, Aug. 1950, p. 140-144.

Selection factors; microstructure, mechanical properties, and heat treatability of various types. (T7, AY)

410-T. Alloy Steel Cuts Maintenance Costs in Aggregate Plant at Buggs Island Dam. *Engineering News-Record,* v. 145, Sept. 28, 1950, p. 40-41.

Several uses of a Mn-Mo alloy steel on a Corps of Engineer project on the Roanoke River in central Virginia. (T4, AY)

411-T. Plastic Screw With Metal Core. *Modern Plastics,* v. 28, Oct. 1950, p. 80-81.

New fastener combines high strength with electrical insulation, self-locking characteristics and excellent vibration and chemical resistance. (T7)

412-T. Aluminum Mesh Ceiling. *Architectural Forum,* v. 93, Sept. 1950, p. 136.

Ceiling used in a showroom hides overhead utilities and saves $2.65 per sq. ft. (T26, Al)

413-T. Galvanized Steel Windows Need No Paint—No Maintenance. *Architectural Forum,* v. 93, Sept. 1950, p. 144.

Windows are galvanized before bonderizing, with the Zn coating extra thick to assure long life. Windows so treated have stood up without painting for 30 years or more. (T26, L16, CN, Zn)

414-T. New Aluminum Dome Brightens Mercer County Courthouse. *Modern Metals,* v. 6, Sept. 1950, p. 20-21. (T26, Al)

415-T. Commercial Uses of Magnesium in Germany. Parts III-IV. (Concluded.) E. J. deRidder. *Modern Metals,* v. 6, Aug. 1950, p. 22-24; Sept. 1950, p. 29-32.

Part III: Applications for aircraft, truck wheels, buses, locomotives, streetcars, and cannons. Part IV: uses in machine construction, printing presses, the textile industry, the electrical industry, office machines, domestic appliances, etc. (T general, Mg)

416-T. The Man With the Big Picture Tube. *Steel Horizons,* v. 12, Fall 1950, p. 6-7.

Title refers to Allen B. DuMont, who is now developing a 30-in. television tube. Varied uses of stainless steel in the picture tubes, including the all-metal type. (T1, SS)

417-T. New Beauty for Milady's Table. *Steel Horizons,* v. 12, Fall 1950, p. 10-11.

Production of stainless-steel table ware. (T10, SS)

418-T. Meet a Business Built on Rings. *Steel Horizons,* v. 12, Fall 1950, p. 14-15.

Production of stainless-steel and other rings for miscellaneous uses in industry by Dresser Industries, Inc. (T7, SS)

419-T. Getter Materials for Electron Tubes. Werner Espe, Max Knoll, and Marshall P. Wilder. *Electronics,* v. 23, Oct. 1950, p. 80-86.

The specific action and applicability of Ta, Cb, Zr, Th, Ti, Al, Mg, Ba, and P as getters for vacuum tubes. They can be formed as wires, sheets, tubes, or tablets; directly or indirectly heated; they may be powder coatings on hot electrodes; or they can be flashed. 73 ref. (T1, EG-a)

420-T. The Jet Engine Comes of Age. R. P. Kroon. *Westinghouse Engineer,* v. 10, Sept. 1950, p. 194-200.

Fuels, operating characteristics, design, lubrication, and materials of construction. (T25, SG-h)

421-T. Magnetic Amplifiers in Industry. F. N. McClure. *Westinghouse Engineer,* v. 10, Sept. 1950, p. 201-205.

Fundamental principles, circuits, materials of construction and their magnetic properties, operating characteristics, and applications. (T1, SG-n, p)

422-T. Construction Materials in the Paper Industry. Part I. Stock Handling. *Chemical Engineering,* v. 57, Sept. 1950, p. 211-212, 214-219.

Separate articles as follows: "Lead", Kempton H. Roll; "Monel, Nickel, Inconel and Ni-Resist", H. O. Teeple; "Worthite", W. E. Pratt; "Cements", Raymond B. Seymour; and "Iron and Steel", Arthur E. May and Albert W. Spitz. (T29, Pb, Ni, ST)

423-T. Highly Corrosion Resistant Spring Material Finds Varied Use. Kenneth Rose. *Materials & Methods,* v. 32, Sept. 1950, p. 54-55.

Because of its exceptional combination of properties, Elgiloy, a Co-Cr-Ni alloy, has found many important applications outside of its original use as a watch-spring material. (T7, Co, EG-g)

424-T. Behavior of Electroformed Silver-Lead Bearings in the Internal Combustion Engine. (In German.) Martin Rossenbeck. *Zeitschrift für Metallkunde,* v. 41, Apr. 1950, p. 109-114.

Bearing properties of lead bronze and Cu bearings, and results of tests made with Ag-Pb bearings containing 0.4, 1.25, and 2.5% Pb. The test results are not directly comparable because of nonuniform conditions in their electrodeposition. In general, it was found that the 1.25% Pb bearing is inferior to the other two. No fatigue up to 47.4×10^6 cycles was observed. 10 ref. (T7, Q7, Ag, SG-c)

425-T. Fatigue Tests on Hollow Bars of the Pure Welding Rods, "Arcos-Stabilend-B" and "Arcos-Ductilend-55" Under Multiaxial Stress Conditions. (In German.) M. Ros. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 16, July 1950, p. 193-199.

Methods and results of fatigue as well as static tests on the above structural-steel welding rods; shows that Mohr's fracture theory applies to multiaxial static as well as tensile fatigue stresses. (T5, Q7, CN)

426-T. Electrode Materials for Electrical Resistance Welding. (In German.) Karl Meier. *Metall,* v. 4, Aug. 1950, p. 330-332.

Materials discussed are a Cu-Cd alloy (1.37% Cd, traces of Pb, balance Cu) and a Cu-Ag-Cd alloy (1.4% Cd, 5.64% Ag, traces of Pb, balance Cu). Their recrystallization and soft-annealing temperatures, mechanical properties, and electric conductivities at different temperatures were determined and compared with the same properties of electrolytic Cu. (T5, Cu)

427-T. How To Select Stainless Steels. (In French.) L. Guitton. *Métaux & Corrosion,* v. 25, Apr. 1950, p. 91-99; June 1950, p. 164-169.

Different types, indicating their chemical and physical properties and main fields of application (from the point of view of French industries). Part I particularly emphasizes the use of stainless steels in chemical engineering. Final installment reviews miscellaneous fields of application. (T29, Q general, SS)

428-T. Production of Electrodes for Welding High-Strength Alloy-Steel Structures. (In Russian.) M. B. Eksler. *Avtogennoe Delo* (Welding), v. 21, July 1950, p. 19-21.

Production of new types of electrodes suitable for welding of low-carbon and alloy-steel high-pressure pipe lines. Special machines used in electrode production. (T5, CN, AY)

429-T. Tests on the Aluminum-Steel Structure of the Steamship "President Wilson". (In French.) John Vasta. *Revue de l'Aluminium,* v. 27, July-Aug. 1950, p. 266-269.

Schematic diagram shows use of Al. Extensive structural tests show that Al improves the stress condi-

tions in the heavier loaded regions of the steel hull while reducing weight. (T22, Al)

430-T. Heavy-Duty Rover Diesel Engine Develops 350 H.P. and Weighs 1.9 Kg. Per H.P.! (In French.) *Revue de l'Aluminium,* v. 27, July-Aug. 1950, p. 270-272.

Operating data. Superior results obtained by use of Al alloys for all cast parts. (T25, Al)

431-T. Porous Chromium Plating of Aluminum Cylinders. (In French.) *Revue de l'Aluminium,* v. 27, July-Aug. 1950, p. 273-276.

Replacement of steel-sleeved cylinders by Cr-plated Al cylinders has allowed replacement of a small engine by a new model 40% lighter, 35% cheaper, 32% more powerful, and said to be superior in service life. (T25, Al)

432-T. "Molded Houses". (In French.) Maurice Victor. *Revue de l'Aluminium,* v. 27, July-Aug. 1950, p. 280-282.

Use of Al and Mg panels as forms for pouring concrete in mass production of low-cost housing. Because of light weight, the forms are readily moved from job to job. (T26, Al, Mg)

433-T. "Metallic Wood". (In German.) E. J. Ritter. *Kunststoffe,* v. 40, Aug. 1950, p. 255.

A laminated product of sheet metal and veneer or plywood joined by "Tegofilm"—a very thin layer of paper between two layers of phenolic resin. Uses, methods of production, and properties. (T10, K12)

434-T. Cemented Carbides in Industry. H. W. Greenwood. *Machinery Lloyd* (Overseas Edition), v. 22, Sept. 16, 1950, p. 88-89, 91, 93.

Surveys applications, with emphasis on uses outside the cutting-tool field. (T6, C)

435-T. Designing Structures in Aluminium. *Machinery Lloyd* (Overseas Edition), v. 22, Sept. 16, 1950, p. 94-97, 99.

Recent unusual examples of welded Al structures. (T26, Al)

436-T. Optimum Use of Nickel Alloy Steels in Low-Level Transformers. L. W. Howard. *Audio Engineering,* v. 34, Oct. 1950, p. 20-21, 50.

Problems involved in making high-quality transformers, and a bibliography on transformer design. 26 ref. (T1, AY, SG-p)

437-T. Copper-Silver Alloy Wire. B. M. Pearson. *Wire Industry,* v. 17, Sept. 1950, p. 755-756.

Some recent developments reported in the technical literature. Wire developed at Battelle Memorial Institute for U. S. Army Signal Corps, also papers on the following topics: abrasive wear of metals, effect of inclusions on fatigue in steel and oxide films on Ni-Cr-alloy heater wire. (T1, R1, R2, Q7, Cu, Ag, Ni, Cr, ST)

438-T. Materials Selection: One Key to Production Economy. *Machine Design,* v. 22, Oct. 1950, p. 126-128.

Series of case histories in which materials utilized influenced greatly the final result: chain-drive sprocket (sintered alloy); rotor plate for steam valve (carbon-graphite); valve seat for service-station pump (carbon-graphite); wing valve for rotary pump (sintered alloy); bearing block (porous bronze); and pump impeller (wrought and forged Al). (T7, H general)

439-T. The Fabrication and Finishing of Coca-Cola Coolers. E. H. Wilkins. *Finish,* v. 7, Oct. 1950, p. 19-22.

Equipment and procedures including welding, forming, and finishing. (T10, L general, K general, G general, CN)

440-T. Efficient Planning and Engineering for Welding These Stainless Steel Units Result in Quality Production. *Industry & Welding,* v. 23, Oct. 1950, p. 28-29.

Production of kitchen and hospital equipment by S. Blickman, Inc., Weehawken, N. J. (T10, K general, SS)

441-T. Aluminum Alloys. E. D. Verink, Jr., and H. W. Fritts. *Industrial and Engineering Chemistry,* v. 42, Oct. 1950, p. 1955-1956.

New applications reported during past year. (T general, Al)

442-T. Aircraft Designers Look to "Newer" Structural Metals. *Steel,* v. 127, Oct. 9, 1950, p. 82-84.

Aeronautical research and development trends which indicate important roles for Mg alloys, Ti, sandwich construction, rolled tapered sheet, thin integrally-stiffened sheet, tapered extrusions, structural adhesives, and high-temperature materials for engines. (T24)

443-T. Tantalum Electrolytic Capacitors. M. Whitehead. *Bell Laboratories Record,* v. 28, Oct. 1950, p. 448-452.

Advantages over aluminum, metallized-paper, and foil-paper capacitors, especially for miniaturized equipment. Electrolytic capacitors offer by far the most capacitance for their size and the lowest cost per microfarad. The Ta type are much more reliable than the Al

type and provide for further size reduction. Comparative characteristics are charted. (T1, Ta)

444-T. Condensed Review of Some Recently Developed Materials Arranged Alphabetically by Trade Names. *Machinery* (American), v. 57, Oct. 1950, p. 164-176.

A wide variety of metallic and nonmetallic materials. Properties and applications are summarized in short paragraphs.
(T general, Q general)

445-T. 1,000 Units Per Year. *Die Castings,* v. 8, Oct. 1950, p. 44-48.

Use of Zn die castings in automobile wheel-aligning equipment shows that die castings can be profitably made even when total production is low. (T21, Zn)

446-T. Improved Nails; Their Driving Resistance, Withdrawal Resistance, and Lateral Load-Carrying Capacity. E. George Stern. *Transactions of the American Society of Mechanical Engineers,* v. 72, Oct. 1950, p. 987-997; discussion, p. 997-998.

Approximately 3600 tests were performed on properties of 2, 2½, 3, 3½-, and 4-in. long plain-shank, spirally grooved, and annularly grooved nails in southern yellow pine, white oak, and beech. Data on nail properties, as influenced by nail type, size, point, shank pilot, steel composition, heat treatment, cement coating, wood species, wood density, and annual rings of the wood.
(T7, CN)

447-T. Automotive Gear Steels — How Industry Selects and Heat-Treats Them. *SAE Journal,* v. 58, Oct. 1950, p. 25-29. Excerpts from "Economics of Automotive Gear Steels and Their Heat-Treatment" by V. E. Hense, H. H. Miller, and R. B. Schenck.

Previously abstracted from *Materials & Methods,* and *Automotive Industries.* See items 301-T and 333-T, 1950. (T7, T21, J general, ST)

448-T. Earthmover Blades Field Tested for Wear. *SAE Journal,* v. 58, Oct. 1950, p. 66-67. Based on "Grader Blades and Other Cutting Edges, Requirements and Specifications", by R. F. Bourne.

Results of tests on blades in the "as is" condition, blades with field-applied hard surfacing of various types, 14% Mn blades, and shot blasted blades. Costs and recommendations. (T4, Q9, CN, AY)

449-T. Bearing Composition, Application and Durability—Today and in the Future. E. Crankshaw. *Industry and Power,* v. 59, Sept. 1950, p. 100-102.

New bearing alloys, improvements in design, lubricants, etc.
(T7, SG-c)

450-T. Application of Iron Powder in Radio and Television Circuits. F. W. Edwards. *Proceedings, Metal Powder Association,* v. 6, 1950, p. 42-48.

Advantages of powder parts in producing circuit stability. Points out difference between normal powder metallurgy and the radio core. Core specifications; applications.
(T1, Fe)

451-T. The Use of Metal Powder Parts as Friction Material. L. P. Kane. *Proceedings, Metal Powder Association,* v. 6, 1950, p. 59-74.

Emphasizes performance properties. Copper is the main element in the typical composition given.
(T7, Q9, Cu)

452-T. Copper Battens Installed on Roof of Senate Wing. *Roofing, Siding and Insulation,* v. 11, Oct. 1950, p. 8.

Believed to be the first example of this use. (T26, Cu)

453-T. Developmental Possibilities of Steel Construction by a Combination of Building Methods. (In German.) W. Cornelius. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, Aug. 21, 1950, p. 667-670.

Advantages of a building method combining structural steel with reinforced concrete in the construction of buildings and bridges.
(T26, CN)

454-T. First Clutch Housing of Die Cast Aluminum. Joseph W. Steel. *Automotive Industries,* v. 103, Oct. 15, 1950, p. 32-33, 98.

Used on Nash automobiles. Mechanical-test setups and test results.
(T21, Q general, Al)

455-T. Cooling Rates in Modern Furnaces. M. H. Mawhinney. *Industrial Heating,* v. 17, Oct. 1950, p. 1708-1710, 1712, 1714, 1870-1872, 1874, 1876, 1878.

Methods by means of which the cooling of furnaces under different conditions may be estimated in a simple manner. Tables and graphs cover batch-type furnaces and continuous furnaces. (T5)

456-T. Steel Welding Wire. G. E. Claussen and H. E. Sincock. *Wire and Wire Products,* v. 25, Oct. 1950, p. 841-843, 846-847, 908-909, 911.

Steel welding wire is produced by steel mills for further processing into finished welding rods and electrodes. Compositions of principal commercial types, and a number of experimental types. Compositions of three experimental coatings. Test results on properties and compositions of welds made with the different electrode and coating compositions. (T5, K1, K2, ST)

457-T. Materials at Work. *Materials & Methods,* v. 32, Oct. 1950, p. 70-71.

Includes: Al crossarms for power-transmission lines; cast steel "benthoscope"—deep-sea diving bell; steel-hubbed Al gears. (T general, Al, CI)

458-T. "The Dome of Discovery"—Largest Aluminum Structure Yet. *Modern Metals,* v. 6, Oct. 1950, p. 21.

A 365-ft. diam. structure being constructed in Britain. (T26, Al)

459-T. Light, Strong Electrical Connectors of Aluminum. *Modern Metals,* v. 6, Oct. 1950, p. 26-27.

Special fittings for military equipment made by American Phenolic Corp. Housings are Al die castings and parts are machined from Al rod. (T1, Al)

460-T. Aluminum's Next Big Target—The Container Industry. *Modern Metals,* v. 6, Oct. 1950, p. 36-39.

Present applications to drums, collapsible tubes, food cans, etc. Advantages which should lead to much more extensive utilization. (T10, Al)

461-T. Tank Cars. R. W. Lahey. *Chemical Engineering,* v. 57, Oct. 1950, p. 203-204, 206.

Use of steel (carbon or stainless), aluminum, nickel, or resin linings in construction of tank cars. Types recommended for typical commercial chemicals. (T29, Al, ST, Ni)

462-T. Construction Materials in the Paper Industry. Part II. Bleaching. *Chemical Engineering,* v. 57, Oct. 1950, p. 217-218, 220-223.

Part II of a symposium in which materials of construction are evaluated for various services in the paper industry. Consists of the following: "High-Silicon Irons", Walter A. Luce; "Cements", Raymond B. Seymour; "Nickel, Nickel Alloys", H. O. Teeple; "Rubber", James P. McNamee, and "Coatings", Kenneth Tator. (T29)

463-T. Aluminum Extending Residential Sheet Metal Work. *Sheet Metal Worker,* v. 42, Oct. 1950, p. 46-47.

New exterior and interior applications. (T26, Al)

464-T. The Manufacture of Large Press Dies. *Machinery Lloyd* (Overseas Edition), v. 22, Sept. 30, 1950, p. 97-99, 101.

How costs can be drastically reduced by building up such dies from "composite forgings", which comprise a toolsteel cutting edge flash-butt-welded to a mild steel base. (T5, K3, TS, CN)

465-T. Aluminium Footbridge at Pitlochry. *Engineer,* v. 190, Oct. 13, 1950, p. 368-370.

Includes preliminary experimental work on riveting procedures. (T26, K13, Al)

466-T. How To Make Armament. *American Machinist,* v. 94, Oct. 30, 1950, p. 99-107.

Bibliography of *American Machinist* articles since 1938 concerned specifically or basically with armament production. The articles are indexed in a list subdivided into major categories such as "assembly" or "processes," and in turn subdivided into groups such as "welding" or "presswork." Each listing bears one or more of four initials, "A" for aircraft, "V" for vehicles, "S" for ships, and "O" for ordnance or weapons. (T2, G general)

467-T. Aluminum Nails Gain Favor Among Users. R. L. Hatschek. *Iron Age,* v. 166, Nov. 2, 1950, p. 106.

Increased consumption and superior properties. (T7, Al)

468-T. Welded Steel Drier Rolls Increased Paper Production and Reduced Maintenance. Harry Fieberts. *Paper Trade Journal,* v. 131, Nov. 2, 1950, p. 21-23.

Welded rolls used in the paper industry, and their advantages. (T29, ST)

469-T. Problems of Change-Over From Steel to Aluminum in Fabricating Truck Bodies. *Light Metal Age,* v. 8, Oct. 1950, p. 8-9.

How demand for lighter truck bodies to allow increased payloads forced a steel fabricator to adjust to new techniques for handling aluminum. (T21, Al)

470-T. Milium. *Light Metal Age,* v. 8, Oct. 1950, p. 11.

New resinated-aluminum sprayed fabric that reflects the heat radiated from the body to make clothing warmer. (T10, Al)

471-T. What's New in Mold Making. J. L. Morrison. *India Rubber World,* v. 123, Nov. 1950, p. 191-192.

New developments in the plastics mold-making industry cover both mold-making machinery and mold steels. (T29, AY)

472-T. Electrode Deterioration in Transmit-Receive Tubes. Judson C. French. *Journal of Research of the National Bureau of Standards,* v. 45, Oct. 1950, p. 310-315.

Investigation of the failure of a modified 1B24 TR tube revealed the cause to be short circuiting of the pulsed keep-alive cathode to its anode, due to formation of an unusual deposit on the cathode insulation and on the nearby anode surfaces. The glow discharge normally present breaks into a momentary arc,

which by local heating of the cathode frees the metal that forms the deposit. Use of 18-8 stainless-steel cathodes provided great improvement over the Kovar previously used. Ni anodes were used in all cases. (T1, R1, SS)

473-T. Are Stainless Conveyor Belts Commercially Feasible? *Steel,* v. 127, Nov. 13, 1950, p. 100-101.

Development work to date. (T5, SS)

474-T. Magnesium in the NACA's Pilotless Aircraft. Caldwell C. Johnson, Jr. *Magazine of Magnesium,* Nov. 1950, p. 2-5.

Supersonic-research model used for basic aerodynamic research at high speeds. Properties and methods of fabrication. (T24, Mg)

475-T. Modern Nickel Plating: the Solution to Varied Problems. *Inco Magazine,* v. 24, Autumn 1950, p. 4-7.

An illustrated survey. (T general, L17, Ni)

476-T. New Pump for Many Services. *Inco Magazine,* v. 24, Autumn 1950, p. 14-15.

Pump made in five sizes and designed to handle heavy or light, viscous or non-viscous liquids. Castings of five different Cu-Ni alloys containing 20-30% Ni are used, also a Type 316 stainless steel spring. (T7, Cu, SS)

477-T. New Metal Outboard for Salt Water. *Inco Magazine,* v. 24, Autumn 1950, p. 16-17.

Hull is entirely made of monel metal. (T22, Ni)

478-T. USAF Testing Titanium as Structural Material for Planes. *CADO Technical Data Digest,* v. 15, Nov. 1950, p. 6-7.

(T24, Ti)

479-T. Reinforced Lumber. *Industrial and Engineering Chemistry,* v. 42, Nov. 1950, p. 10A, 14A, 18A.

Unusual processes in which wood is impregnated with molten metal. Use as self-lubricated wooden bearings is suggested. Physical properties. (T7)

480-T. Stainless Jackets for Cold Water Exterior Risers. *Sheet Metal Worker,* v. 42, Nov. 1950, p. 44, 46.

A practical way of providing air conditioning for an older type building was solved by running chilled-water risers up the south side. They are protected by stainless-steel columns that add a modern note to the building. (T27, SS)

481-T. Aluminium in Houses. H. A. Moore. *Transactions of the Indian Institute of Metals,* v. 1, Apr. 1949, p. 233-245; discussion, p. 245-248.

An illustrated survey. (T26, Al)

482-T. Hardened Steel Rolls. Their Manufacture and Use. C. W. Hirst and W. Shaw. *Transactions of the Indian Institute of Metals,* v. 3, 1949, p. 229-251.

Early history of rolling mills and rolls. The properties required in rolls for the manufacture of nonferrous sheets and strip. Steel compositions used, care and precautions required during forging, machining, hardening, grinding, etc. The types of failures encountered in rolls and their causes. Heat treatment. A typical analysis contains 1.95% Cr. (T5, F23, AY)

483-T. Gadgets: Small Attention-Getters. *Die Castings,* v. 8, Nov. 1950, p. 21, 42.

New device for securing the attention of the reader to direct-mail advertising. Example shown is a small die-cast horseshoe for enclosure in letters. (T10, E13)

484-T. Where Corrosion Is Most Severe. *Die Castings,* v. 8, Nov. 1950, p. 22-23, 41-42.

Designed to operate under conditions of extreme heat and cold, and exposed to grease, oil, animal fats, blood, and salt brine—truck wheels for the meat-packing industry have Zn die-cast hubs and hub caps. (T21, R7, E13, Zn)

485-T. From Wood Fabrication to Die Cast Aluminum. *Die Castings,* v. 8, Nov. 1950, p. 36-39.

Redesign of Christian Becker analytical balance. (T8, E13, Al)

486-T. Test Silicon Bronze Bolts for Electrical Connectors. Julian Rogoff. *Electric Light and Power,* v. 28, Nov. 1950, p. 106, 155.

Size, material, finish, and surface conditions have a definite bearing on the effectiveness of bolts used in electrical connectors. Graphs give relationship between contact resistance and contact pressure for three surface finishes (mechanical); torque vs. axial thrust for bolt-nut assemblies of the same size but four different alloy combinations; and torque vs. axial thrust for dry and lubricated assemblies. (T7, T1, K13, Cu)

487-T. Magnesium Faces the Fifties. *Modern Metals,* v. 6, Nov. 1950, p. 17, 19, 21. Excerpts from talk by Edward S. Christiansen.

Future prospects for increasing use of magnesium. (T general, Mg)

488-T. Extruded Magnesium Trailer Flooring. A. E. Williams. *Modern Metals,* v. 6, Nov. 1950, p. 22-23.

Why and how Fruehauf has adopted magnesium for trailer floors. (T21, Mg)

489-T. Magnesium in Aircraft Structures. J. P. Donald Garges. *Modern Metals*, v. 6. Nov. 1950, p. 25-26.

Use of Mg promises many design and production economies for aircraft companies, and is ideally suited for today's high-speed jets and mammoth bombers. (T24, Mg)

490-T. Use of Magnesium Doubles Dry Cell Battery Capacity. Paul Filter. *Modern Metals*, v. 6, Nov. 1950, p. 35-36.

Development of the Mg dry cell by Dow Chemical Co. working in conjunction with the Signal Corps. (T1, Mg)

491-T. The Importance of Chemical Products to Automobiles. C. L. McCuen. *Automotive Industries*, v. 103, Nov. 15. 1950, p. 46-47, 100.

Lists 250 chemical products used directly or indirectly in the automobile industry. (Metals and alloys are included.) Weights of 28 materials or groups of materials used in an average four-door sedan. (Amounts range from 2556.29 lb. of steel to 0.0016 lb. of vanadium.) Chemical problems awaiting solution (including fuels, lubricants, batteries, etc.) (T21)

492-T. Town Gas in a Dental Workshop. William Kirk. *Gas Journal*, v. 264, Nov. 1, 1950, p. 61-65, 68-69.

Equipment and procedures for casting metal plates and for making plastic dentures. (T10)

493-T. Metallic Structures Consisting of Bent Sheets Joined by Welding. (In French.) J. Prouvé. *Soudure et Techniques Connexes*, v. 4, July-Aug. 1950, p. 141-146; discussion, p. 147-148.

Technique using steel or Al sheets. Recommends this type of construction for "prefabricated houses". Advantages for specific applications. (T26, K general, ST, Al)

494-T. (Book) **La Technique du Chauffage Electrique. Tome I. Theories et Calculs.** (Technology of Electrical Heating. Vol. I. Theories and Calculations). C. Frérot. 503 pages. 1950. Gauthier-Villars, Paris, France. 2300 frs. Covers both industrial and domestic applications. Part I is a general summary of the fundamentals of electric heating. Part II deals with transformation of electric energy to heat energy. Part III covers resistance of metals to electric current, characteristics of alloys for resistance wiring, and types of heating elements. Part IV covers electric boilers, decomposition of water by electric current, and resistivity characteristics of water. Part V discusses heat transmission, steam accumulators, and the storing of heat energy. (T5, P15)

495-T. (Book) **Fortschritte im Stahlbeton.** (Progress in Concrete-Reinforcing Steel). R. Saliger. 138 pages. 1950. Franz Deuticke, Vienna, Austria. $3.20.

Technology and mechanical properties of steel reinforcing bars for concrete. Topics include tensile strength, ductility, slipping resistance, crack formation, and the importance of certain qualities to the strength of beams, columns, and structures as a whole. Types of bars and research results are mainly European. Includes bibliography. (T26, Q23, CN)

496-T. Aluminum Conductors for Aircraft. W. W. Schumacher. *Electrical Engineering*, v. 69, Dec. 1950, p. 1064. (Condensed from paper to be published in *AIEE Transactions*, v. 69, 1950.)

Substantial weight savings can be achieved by substitution of Al for Cu. Development of optimum terminal design which has minimized previous difficulties caused by increasing terminal resistance with age, due to oxidation. (T1, T24, Al)

497-T. USAF Tests Titanium in Airplane Structurals. *Steel*, v. 127, Nov. 27, 1950, p. 60-61.

Current Air Force research which may result in wide use of titanium alloys in the airframe structure of supersonic aircraft and missiles. The work is being done in cooperation with Battelle Memorial Institute and other Air Force contractors. (T24, Ti)

498-T. Materials of Construction. 43 authors. *Chemical Engineering*, v. 57, Nov. 1950, p. 107-154.

14th annual report is divided into 13 major sections, each dealing with materials of construction for a common corrosive chemical; subsections on the major types of materials of construction. Numerous chemical-process flowsheets, indicating recommended materials of construction for each of the units or parts of units. Concludes with 12-page directory of materials, giving trade name or common designation, manufacturer, composition, and most important applications. (T29, R general)

499-T. Packaging Notebook. VII. Metal Drums. *Chemical Engineering*, v. 57, Nov. 1950, p. 239-240, 242, 244.

Fabrication drums for transportation and storage of miscellaneous liquid chemicals. ICC specifications. Research program of Steel Shipping Container Institute at Battelle Me-

morial Institute on linings for the drums. (T26, T29, CN)

500-T. Construction Materials in the Paper Industry. Part II. Bleaching. *Chemical Engineering,* v. 57, Nov. 1950, p. 255-256, 258-259, 261-264.

"Chlorimet", Walter A. Luce; "Durimet 20", Walter A. Luce; "Tantalum", Leonard R. Scribner; "Iron and Steel", Arthur E. May and Albert W. Spitz; "Worthite", W. E. Pratt; "Coatings", Kenneth Tator; "Lead", Kempton H. Roll; and "Rubber", James P. McNamee. (T29, R5, Ni, Cr, Ta, Fe, ST, Pb)

501-T. Lighter Freight Cars From Aluminum. Hugh G. Jarman. *Canadian Metals,* v. 13, Nov. 1950, p. 10, 12, 49.

Advantages. Structural details, flooring and siding, and fabrication. (T23, Al)

502-T. Metals for Gas Turbines. Norman L. Mochel. *Journal of the American Society of Naval Engineers,* v. 62, Nov. 1950, p. 920-929.

Reprinted from *American Society of Mechanical Engineers,* Paper No. 49-A-85, Dec. 1949. See item 245-T, 1950. (T25, SG-h)

503-T. Close Tolerance Die Castings Cut Auto Transmission Cost. *Steel,* v. 127, Dec. 4, 1950, p. 96-97.

A variety of precision Al die castings used in the above. (T21, E13, Al)

504-T. Extruded Bronze Speeds Jet Bomber Production. *Steel,* v. 127, Dec. 4, 1950, p. 100.

Use of extruded bronze counterweights to eliminate flutter in tail sections of the Boeing B-47B Stratojet. Substitution for steel eliminates undesirable magnetic effects. Saving in machining time more than offsets increased initial cost. (T24, Cu)

505-T. Metallurgy in Petroleum Refining. Donald A. Craig. *Mines Magazine,* v. 40, Oct. 1950, p. 80-85, 96.

Various aspects, including corrosion, welding, high-temperature metals, testing and inspection, etc. (T29)

506-T. "It Checks". *Industry & Welding,* v. 23, Dec. 1950, p. 43, 45.

Light-weight magnesium chassis-frame checking fixture with close tolerances fabricated by Magline, Inc. It greatly reduces the weight-handling factor for a large automobile manufacturer. (T5, Mg)

507-T. Designing To Meet Sanitary Needs. Frank Mittelberger. *Product Engineering,* v. 21, Dec. 1950, p. 144-149.

Design of equipment for processing of foods, pharmaceuticals, and other products where a high degree of freedom from contamination is required. Material selection and surface conditions. Construction of valves, fittings, pumps, kettles, heat exchangers, etc. (T29)

508-T. Bearing Metals—Nickel-Alloyed Brass and Bronze. James S. Vanick. *Foundry,* v. 78, Dec. 1950, p. 80-83, 211-212.

Compositions of bronzes for various types of bearing applications. Third of a series on nickel-alloyed brass and bronze. Tables give compositions and pertinent mechanical properties. (T7, Q general, Cu)

509-T. Cast Iron Gas Mains Today; Technical Observations. W. Boden. *Gas,* no. 2, Sept. 29, 1950 (Supplement to *Gas Journal*), p. 5-10.

Casting methods, standardization, design, protective coatings, testing, installation procedures, causes of failure, and gas-flow formulas applicable to pipe lines. (T4, E general, L general, S21, CI)

510-T. Form + Finish = Gift Sales. *Die Castings,* v. 8, Dec. 1950, p. 19-21.

A few of the more interesting gift and premium items which use one or more Zn die-cast parts. (T10, Zn)

511-T. Longer Life for Cutting Wire Due to Die Cast Mounting. *Die Castings,* v. 8, Dec. 1950, p. 24-27.

Die-cast Al frames for miscellaneous food cutters and slicers. (T10, Al)

512-T. Die Cast Piston Replaces 2-Piece Screw Machine Part. *Die Castings,* v. 8, Dec. 1950, p. 29.

Al-alloy die casting is used for "reverse servo pistons" for Buick Dynaflow transmissions. Advantages. (T21, Al)

513-T. Uninterrupted Operation of Process Machine Depends on Die Cast Parts. *Die Castings,* v. 8, Dec. 1950, p. 32-35.

Bottle-unpacking machine used in breweries and soft-drink plants, also some of its die-cast Al parts. (T29, Al)

514-T. How To Improve Product Function. *Die Castings,* v. 8, Dec. 1950, p. 22, 61-63.

Die-cast Al-alloy housing for hair clipper. (T10, Al)

515-T. Aluminum Deck for the Huey Long Bridge. *Railway Engineering and Maintenance,* v. 46, Dec. 1950, p. 1121-1124. Huey Long Bridge Gets Aluminum Deck. *Railway Age,* v. 129, Dec. 9, 1950, p. 36-39.

Procedures used in replacement of the original galvanized sheet-steel deck with aluminum. (T26, Al)

516-T. Cast-Iron Floor Plates for Car-Wheel Shops. L. B. Curtiss. *Railway Engineering and Maintenance,* v. 46, Dec. 1950, p. 1131. (T26, CI)

517-T. Paint Grinding Balls Made of Improved Alloy Cast Iron. Kenneth A. DeLonge. *Paint and Varnish Production,* v. 30, Sept. 1950, p. 17, 22.

Advantages of use of "Ni-Hard" —a martensitic white iron containing 4.0-4.75% Ni. (T29, CI)

518-T. Sintered Carbides—New Tool of Ceramics. John W. Graham and W. L. Kennicott. *Ceramic Industry,* v. 55, Dec. 1950, p. 93-94, 96.

Properties and applications of carbides as applied to various tools for processing of ceramic ware. (T6, C-n)

519-T. ELC Stainless for Pulp Mill Duct System. George T. Dexter. *Welding Engineer,* v. 35, Dec. 1950, p. 30-33.

Use of Type 316 ELC (extra-low carbon) stainless steel. Includes description of arc welding procedure. (T28, K1, SS)

520-T. Rolled Alloys Hold Important Place in Field of Fabricated Heat Resistant Equipment. Paul Goetcheus. *Industrial Heating,* v. 17, Oct. 1950, p. 1762-1764, 1766, 1768, 1770, 1772.

Illustrates a wide variety of components made from rolled mill forms of heat resisting alloys. Compositions suitable for temperatures above and below 1600° F. Use of high-temperature expanded metal for trays, baskets, etc. used to hold parts during heat treatment. (T5, SG-h)

521-T. At British Lion Studios, Shepperton. *Light Metals,* v. 13, Sept.-Oct. 1950, p. 494-496.

Use of aluminum bus-bars in motion-picture studio. (T1, Al)

522-T. Aluminium in Commercial Vehicles. E. L. Oglethorpe. *Aluminium Development Association,* "Proceedings at a Symposium on Aluminium in Road Transport", 1950, p. 15-27.

Use for truck bodies. Developments during the past 29 years. (T21, Al)

523-T. Aluminium in Public Service Vehicles. A. J. Romer. *Aluminium Development Association,* "Proceedings at a Symposium on Aluminium in Road Transport", 1950, p. 28-39.

Use for engine, frame, and body parts. (T21, Al)

524-T. Aluminium in the Private Car. E. S. White. *Aluminium Development Association,* "Proceedings at a Symposium on Aluminium in Road Transport", 1950, p. 40-45.

Engineering and tooling aspects concerned with body design. (T21, Al)

525-T. Aluminium From the Users' Angle. G. Geoffrey Smith. *Aluminium Development Association,* "Proceedings at a Symposium on Aluminium in Road Transport", 1950, p. 78-86.

Advantages of the use of aluminum in automobile construction. (T21, Al)

526-T. The Behavior of Light-Metal Sheets Used on Hot-Plate Presses. (In German.) Hermann A. J. Stelljes. *Zeitschrift für Metallkunde,* v. 41, Sept. 1950, p. 307-309.

The phenomenon of shrinkage of Al sheets used for pressing plywood. Possible remedies. (T29, P11, Al)

527-T. An Aluminum Alloy in Car Construction. E. C. Hartmann, G. B. Hauser, and R. L. Moore. *Railway Mechanical and Electrical Engineer,* v. 124, Dec. 1950, p. 717-721.

Superior mechanical and corrosion resistant properties of 61S-T6, and its use for freight and passenger-car construction. (T23, Q general, R general, Al)

528-T. Two New Gear Materials. *Machinery* (American), v. 57, Dec. 1950, p. 179-182. Condensed from paper by C. M. Schwitter.

Properties, annealing, manufacturing procedures, and applications of Nitralloy N—an alloy steel which is simply a rather heavily alloyed version of the SAE 4300 type, with no unusual features except the presence of about 1.25% Al. (Ductile iron will be dealt with in the second article.) (T7, J23, Q general, AY)

529-T. Pump Parts Last Longer With Silicon Carbide. J. J. Burns. *Engineering and Mining Journal,* v. 151, Dec. 1950, p. 94-95.

SiC pump parts used by St. Joseph Lead Co., to circulate abrasive Zn-ore suspensions. Comparative wear data. (T7, Q9, C-n, Si)

530-T. Expansion in the Use of Aluminium. E. G. West. *Metallurgia,* v. 42, Nov. 1950, p. 320-325.

Surveys new applications developed since 1929. (T general, Al)

531-T. (Book) **Proceedings at a Symposium on Aluminium in Road Transport.** 100 pages. 1950. Aluminium Development Association, 33 Grosvenor St., London, W.1, England.

Six papers on the use of aluminum in motor vehicles, its properties and fabrication, and aluminum vehicle maintenance. Papers are abstracted separately. (T21, Al)

532-T. (Book) **Schraubenherstellung** (The Production of Screws). 244 pages. Stahleisen, Dusseldorf, Germany.

The production of bolts and nuts, and the history of making these fasteners. Stresses, and testing of raw material and finished bolts. Manufacturing processes, subdivided into production and composition of steel, warm heading and cold heading,

minor processes, threading by chip-removal and plastic deformation, heat treating, and production of nuts. Apparatus and machinery; Standards for materials and finished bolts; patents; and an extensive bibliography. (T7)

533-T. (Book) **Metallische Werkstoffe der Elektro-Technik.** (Metallic Materials in Electrical Technology). A. Schulze. 403 pages. 1950. Metall-Verlag, G.m.b.H., Berlin, W.15, Germany. 24 DM.

Subject is presented in three sections: Electrical conductor materials, metallic resistance materials, and metallic materials for thermocouples. Sections 2 and 3, which make up the bulk of the book, have been published previously but have been enlarged and brought up-to-date for inclusion in the present work. Each section deals with properties and applications of the various metals and alloys suitable for inclusion in the section. 378 ref. (T1, T8, P15, SG-a, q, r)

SECTION V

MATERIALS—

General Coverage of Specific Materials

1V. Magnesium—the Key to the Future. *Light Metals,* v. 12, Dec. 1949, p. 674-675. Based on "High Strength Magnesium Casting Alloy ZK61", by J. W. Meier.

Development of Mg-Zn-Cr casting alloys by Canadian Bureau of Mines. Comparative mechanical properties, compositions, and heat treatments of various German, British, American, and Canadian alloys of this type. (Mg)

2V. Molybdenum; Production, Properties and Applications. G. L. Miller. *Metal Industry,* v. 75, Nov. 18, 1949, p. 439-441.

Concluding installment: Mechanical properties, machinability, workability, weldability, and applications. Reactions with common gases and inorganic chemicals. (Mo)

3V. Cast Iron. Part II. Alloy Cast-Irons. Arthur J. Caddick. *Mining Magazine,* v. 81, Dec. 1949, p. 342-350.

Recent progress with respect to compositions having improved physical properties, corrosion resistance, heat resistance, and special suitability for specific uses or industries. (CI)

4V. New Uses Sought for Gallium. *Chemical and Engineering News,* v. 28, Jan. 2, 1950, p. 40-41.

Properties and a few applications. (Ga)

5V. The Status of Carbides Today. W. G. Robbins. *Tool & Die Journal,* v. 15, Jan. 1950, p. 52-53, 102.

Applications and present status in comparison to other cutting and forming materials. (SG-j)

6V. Steel Products Manual. Sec. 18. Steel Tubular Products. *American Iron and Steel Institute.* Nov. 1949. 239 pages.

Metallurgical aspects, manufacturing practices, and handling methods. Pipe pressure tubes, mechanical tubing, and aircraft tubing. Chemical requirements, standard practice tables, and threading data. (ST)

7V. What Is Acicular Cast Iron? W. W. Braidwood. *Foundry Trade Journal,* v. 87, Dec. 1, 1949, p. 649-653; Dec. 8, 1949, p. 685-689; Dec. 15, 1949, p. 717-719; discussion, p. 719-722.

Theory and practice in acicular-iron production. Photomicrographs show typical microstructures and effects of transformation. Final installment: Heat treatment, testing, mechanical properties, and applications. 20 ref. (CI)

8V. Spheroidal Graphite Cast Iron. W. W. Braidwood and A. D. Busby. *Machinery* (London), v. 75, Dec. 22, 1949, p. 896-902.

Previously abstracted from *Foundry Trade Journal.* See item 14B-106, 1949. (CI)

9V. Development and Status of Malleable Iron. (In German.) Franz Roll. *Neue Giesserei,* v. 36 (new ser., v. 2), Nov. 1949, p. 339-347.

Production, heat treatment, and properties of white and black-heart malleable iron. (CI)

10V. Optimum Design of Steel Castings. (In German.) Georg Schmidt. *Neue Giesserei,* v. 36 (new ser., v. 2), Dec. 1949, p. 373-378.

Principles illustrated by diagrams and illustrations. (CI)

11V. Development ond Properties of a High-Test Malleable Aluminum Alloy. (In German.) H. J. Seemann. *Metall,* v. 3, Nov. 1949, p. 374-375.

Extensive tests were made to investigate the malleability, mechanical strength, and resistance to stress

corrosion of an Al alloy containing 9% Zn, 1.5% Mg, 2.5% Cu, and 0.5% Mn. This alloy compared favorably with duralumin, except in its resistance to stress corrosion when annealed at 100° C. (Al)

12V. Survey of the Demands on Heat Resistant Metals and Today's Possible Solutions. (In German.) F. Rapatz. *Archiv für Metallkunde,* v. 3, Nov. 1949, p. 387-393.

Survey of literature summarizes properties of ferrous and nonferrous alloys at elevated temperatures. 10 ref. (SG-h)

13V. Engineering Applications of Ductile Cast Iron. Albert P. Gagnebin, Keith D. Millis, and Norman B. Pilling. *Machine Design,* v. 22, Jan. 1950, p. 108-114.

Latest data on the material and numerous successful applications. Mechanical properties and machinability. (CI)

14V. Austenitic and Special Stainless Steels. Samuel J. Rosenberg. *Product Engineering,* v. 21, Jan. 1950, p. 113-117.

(Second of two articles.) Basic review of the corrosion resistant or stainless steels. Properties, heat treatments, and fabricating characteristics of the austenitic and special steels. (SS)

15V. Properties of Zirconium. Francis W. Boulger. *U. S. Atomic Energy Commission,* AECD-2726, Mar. 15, 1949, 83 pages.

Thermal, electrical, optical, thermionic, magnetic, mechanical, atomic and nuclear properties. Production, structure, corrosion, working, and special testing of Zr and Zr alloys. 97 ref. (Zr)

16V. (Book) **Titanium in Steel.** George Frederick Comstock, Stephen F. Urban, and Morris Cohen. 320 pages. 1949. Pittman Publishing Corp., 2 West 45th St., New York 19, N. Y.

Correlation and critical summary of available data on the use of Ti as a deoxidizer, as a carbon and nitrogen-stabilizing element, and as an alloying metal in steel. 274 ref. (Ti, ST)

17V. (Book) **Steel and Steel Products.** 674 pages. British Standards Institution, 24-28 Victoria St., London S.W.1, England. (Handbook No. 10.) 25 s.

Divided into three sections. First section contains illustrated articles on about 20 different phases of steel manufacture. The second covers summaries of the essential technical requirements for steel and steel products. The final section covers methods of testing, heat treatment, definitions, conversion factors, and the like. (ST)

18-V. Forging and Welding Titanium. L. B. Frazier. *Iron Age,* v. 165, Jan. 19, 1950, p. 63-67.

Research and development work on ductile titanium conducted at GE Thomson Laboratory. Forging and welding, including inert-arc and resistance welding. Typical welder constants and some notes on the metallography of titanium. (Ti)

19-V. Use of Boron Steel in Production. Fred J. Robbins and J. J. Lawless. *Metal Progress,* v. 57, Jan. 1950, p. 81-89.

Previously abstracted from condensed version in *Iron Age.* See item 21B-40, 1949. (AY)

20-V. Developments of Germanium and Gallium During 1949. John R. Musgrave. *Journal of the Electrochemical Society,* v. 97, Jan. 1950, p. 8C.

New application developments. (Ge, Ga)

21-V. ZK61—A High-Strength Magnesium Casting Alloy. J. W. Meier. *Modern Metals,* v. 5, Jan. 1950, p. 26-28.

See abstract from *Light Metals,* item 1-V, 1950. (Mg)

22-V. Progress in Stainless Steel. *Canadian Metals,* v. 13, Jan. 1950, p. 44. Based on talk by Ernest Thum. (SS)

23-V. Developments in Alloy Steels. T. H. Arnold and C. V. Mills. *Metallurgia,* v. 41, Dec. 1949, p. 75-78.

Some development aspects concerned with steels for high-temperature service, resistance to corrosion, and to wear. (AY, SG-g, SG-h, SG-m)

24-V. Aluminium in 1949. E. D. Iliff. *Metallurgia,* v. 41, Dec. 1949, p. 79-83.

Technical and application developments. (Al)

25-V. Progress in High Duty and Alloy Cast Iron. A. B. Everest. *Metallurgia,* v. 41, Dec. 1949, p. 84-88.

Technological developments of 1949. (CI)

26-V. Some Recent Developments in Magnesium Alloys. R. G. Wilkinson. *Metallurgia,* v. 41, Dec. 1949, p. 91-95.

Alloys based on the Mg-Li system; the Zr-containing casting alloys; and Mg-alloy anodes for galvanic pro-

tection of iron and steel. Mechanical and physical properties and applications. (Mg)

27-V. Copper and Copper Alloys; Technical Progress in 1949. E. Voce. *Metallurgia,* v. 41, Dec. 1949, p. 96-101.

Review of papers presented and published during 1949. Prospecting and ore reserves, smelting and refining, melting and casting, fabrication, finishing and plating, and properties. 72 ref. (To be continued.) (Cu)

28-V. Production of Steel Castings. Charles W. Briggs. *Steel,* v. 126, Jan. 30, 1950, p. 60, 62, 64, 66, 68, 70; Feb. 6, 1950, p. 90-92, 94, 96, 99-100.

Part I: History, applications, and steelmaking methods. Concluding part: Molding operations, cores and their preparation, mold inspection and pouring, finishing operations, heat treatment, and inspection. (CI)

29-V. High Strength Steels. C. L. Altenburger. *American Iron and Steel Institute,* "Technical Committee Activities", 1949, p. 278-292.

Corrosion resistance, welding, forming, drawing, mechanical properties, and design possibilities. (AY)

30-V. Characteristics and Applications of Capped and Rimmed Steels. H. H. Smith. *American Iron and Steel Institute,* "Technical Committee Activities", 1949, p. 293-301.

Production methods, pertinent characteristics, fabrication methods, and a few applications. (ST)

31-V. Physical Properties of Ductile Zirconium. *Iron Age,* v. 165, Feb. 2, 1950, p. 88. Condensed from "Fabrication and Mechanical Properties of Ductile Zirconium", E. T. Hayes, E. D. Dilling, and A. H. Roberson.

Previously abstracted from *American Society for Metals,* Preprint No. 32, 1949. See item 3C-190, 1949. (Zr)

32-V. Potential Uses of Titanium Metal. O. C. Ralston and F. J. Cservenyak. *Industrial and Engineering Chemistry,* v. 42, Feb. 1950, p. 214-218.

Uses of titanium as disclosed by the literature and reported by those who are actually testing its suitability for numerous purposes. The field of usefulness by the Army, Navy, and Air Force. Production is too costly to compete with steel, aluminum, and copper where these cheaper metals can function satisfactorily. 30 ref. (Ti)

33-V. Titanium Alloys. Bruce W. Gonser. *Industrial and Engineering Chemistry,* v. 42, Feb. 1950, p. 222-226.

Fundamental and practical considerations limiting the range of obtainable Ti alloys. Among the most useful alloys are combinations of metal additions, particularly those having considerable solid solubility in either of the allotropic forms of Ti, plus small amounts of C, O_2, or N_2. (Ti)

34-V. Fabrication of Titanium-Rich Alloys; Mechanical Properties of Some Wrought Alloys. E. E. Larsen, E. F. Swazy, L. S. Busch, and R. H. Freyer. *Industrial and Engineering Chemistry,* v. 42, Feb. 1950, p. 237-242.

Melting procedure and furnace used for production of small (1-2 lb.) Ti and Ti-alloy ingots. Fabrication of the billets into specimens suitable for determination of tensile strength, elongation, resistance to oxidation, hardness at elevated temperatures, and resistivity. Of the alloys investigated to date, those containing B, V, W, Fe, Mn-Si, and Al-Cr appear to have the highest mechanical properties. (Ti)

35-V. Hot-Shot Hybrid. *Industrial and Engineering Chemistry,* v. 42, Feb. 1950, p. 16A, 18A.

Application of metal-ceramic combinations ("cermets") for high-temperature, high-strength uses, as in gas turbines, rockets. Fabrication procedures and properties of various compositions. (SG-h)

36-V. Developments in the Iron and Steel Industry During 1949. I. E. Madsen. *Iron and Steel Engineer,* v. 27, Jan. 1950, p. 93-118.

Miscellaneous equipment developments in the blast furnace and coke plant; in steelmaking; in rolling; in finishing; in fuels and furnaces; in materials handling; and in mechanical and electrical devices. Economic data and a table listing electric motors over 300 horsepower applied to main roll drives in the iron and steel and allied industries during 1949. (Fe, ST)

37-V. Simplified Design Procedure for Helical Wire Springs. August J. Kwossek. *Product Engineering,* v. 21, Feb. 1950, p. 140-143.

Fundamental and new design equations. Mechanical-property constants for seven spring materials. (SG-b)

38-V. Recent Developments in Titanium. E. A. Gee, W. H. Van Derhoeff, and C. H. Winter, Jr. *Journal of the Electrochemical Society,* v. 97, Feb. 1950, p. 49-53.

Methods for production of ductile titanium, first by recovery of powder or sponge from the halides, followed by consolidation into workable form by iodide deposition, powder metal-

lurgy, hot rolling, arc melting, induction melting, or resistance melting. 17 ref. (Ti)

39-V. Characteristics and Technology of "Ergol" Alloys. (In Italian.) *Alluminio,* v. 18, Sept.-Oct. 1949, p. 527-553.

Chemical composition; chemical, physical, and mechanical properties; method of production; microstructure; and heat treatment of a series of alloys of the "Ergol" type (5.8% Zn, 2.5% Mg, 1.6% Cu, 0.2% Mn, 0.15% Cr, 0.1% Ti, remainder Al.) (Al)

40-V. The Multiple Uses of Platinum Metals. F. E. Carter. *Metal Progress,* v. 57, Feb. 1950, p. 194-196.

(EG-c)

41-V. A New Cast Iron That Bends. *INCO Magazine,* v. 23, Winter 1950, p. 4-8.

Ductile cast iron developed by International Nickel Co., and a variety of its applications. (CI)

42-V. Copper-Base Alloys Have Wide Range of Properties. R. A. Colton. *American Foundryman,* v. 17, Feb. 1950, p. 49-54.

Various types, typical applications, and recommended foundry practices. (Cu)

43-V. The Ferro-Alloying Metals. W. H. Dennis. *Mine & Quarry Engineering,* v. 16, Feb. 1950, p. 45-52.

Ore resources, concentration and smelting methods, and applications of tungsten, chromium, titanium, ferrosilicon, and manganese. (Fe)

44-V. Nickel Steels. *Materials & Methods,* v. 31, Feb. 1950, p. 83, 85.

Miscellaneous properties, applications, heat treatment, etc., of 3½% and 5% Ni steels. (AY)

45-V. New Stainless Steel Used for Cold Headed and Upset Parts. *Materials & Methods,* v. 31, Feb. 1950, p. 59.

Workability, physical and mechanical properties of Carpenter Stainless No. 10, which contains 0.08% C (max.), 16.00% Cr, and 18.00% Ni. (SS)

46-V. Steel Castings Grow in Importance to the Design Engineer. Marsden R. Atwater. *Western Metals,* v. 8, Feb. 1950, p. 24-25.

Advantages and applications. (CI)

47-V. Gallium; Rare Metal Now Ready for Industry. *Modern Industry,* v. 19, Feb. 15, 1950, p. 70-71.

Unusual properties. Some potential applications. (Ga)

48-V. Technology of Aluminium and Alloys; Some Applications and Basic Properties. *Chemical Age,* v. 62, Feb. 4, 1950, p. 199-201. From *Aluminum Development Association* (London), Bulletin No. 16.

(Al)

49-V. Copper and Copper Alloys; Technical Progress in 1949. E. Voce. *Metallurgia,* v. 41, Jan. 1950, p. 150-152.

Joining, corrosion, recrystallization, grain growth, and applications. 107 ref. (Cu)

50-V. Study on the Materials for Valve Seats at High Temperature and Pressure. I-II. (In Japanese.) Mitsuru Okano and Hideji Hotta. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 13, May 1949, p. 27-30; Aug. 1949, p. 49-52.

Part I: Investigations of the thermal expansion, hardness, corrosion, machinability, abrasion, and microscopic characteristics of Co-Cr-W steels, cast iron of the Si-Mn-Ni-Cr series, 13% Cr steel, and carbon steel. Part II: Investigations of abrasion, galling at high temperature, and corrosion resistance of the same alloys to 3% NaCl; 1, 20, and 40% HCl; 1, 20, and 40% HNO_3; and 1, 20 and 96% H_2SO_4. 24 ref. (SG-h, T7)

51-V. New Precipitation-Hardening Stainless Steels. G. N. Goller and W. C. Clarke, Jr. *Iron Age,* v. 165, Mar. 2, 1950, p. 86-89; Mar. 9, 1950, p. 79-83.

Armco's two new Cr-Ni stainless steels, 17-4 PH and 17-7 PH, employ Cu and Al as precipitation-hardening elements instead of carbide formers. These steels are said to have excellent corrosion resistance plus high strength properties. Physical and mechanical properties; amenability to hot forging, machining, welding, heat treating, cleaning and finishing, and potential applications. (SS)

52-V. The Present Status of Titanium Metal. Felix B. Litton. *Journal of the Electrochemical Society,* v. 97, Mar. 1950, p. 66C-68C.

Production and fabrication methods, properties, and applications of Ti and its alloys. (Ti)

53-V. The Platinum Metals: A Review of Their Properties and Uses. Edmund M. Wise. *Journal of the Electrochemical Society,* v. 97, Mar. 1950, p. 57C-64C.

21 references. (EG-d)

54-V. Cemented Carbide Materials—Their History and Development. W. H. Bleecker. *Tool & Die Journal,* v. 15, Mar. 1950, p. 58-60, 62.

Production, microstructure, mechanical properties, etc. (SG-j)

55-V. Lithium in Modern Industry. *Foote Prints,* v. 21, no. 2, 1950, p. 4-28.

Future prospects, chemistry, reactions of metallic lithium, industrial lithium salts and their uses, lithium grease patents and references, and new applications of lithium salts. Includes several bibliographies. 136 ref. (Li)

56-V. Nodular Iron; A New Engineering Material. F. H. Allison, Jr. *United Effort,* v. 30, Jan.-Feb. 1950, p. 6-8.

Properties, production, structure, and applications. (CI)

57-V. Steel. Wilfred Sykes. *Midwest Engineer,* v. 2, Mar. 1950, p. 3-7.

Properties, research developments, production, ore reserves, and governmental policies affecting the industry. (ST)

58-V. Nodular Iron. F. R. Morral. *Foundry,* v. 78, Mar. 1950, p. 135.

A brief digest of published data. (CI)

59-V. Advances in the Metallurgy of Cast Iron. Clyde O. Penney. *Mines Magazine,* v. 40, Feb. 1950, p. 12-17.

Three recent developments considered of major importance: use of oxygen in the cupola, use of radioactive isotopes in metallurgical research, and production of nodular graphite structures. Describes the latter at some length. 12 ref. (CI)

60-V. A Study of Some Alloys of Titanium in the Manufacture of Which Commercial Titanium Hydride Powder Was Used. W. E. Kuhn, H. V. Kinsey, and O. W. Ellis. *Canadian Mining and Metallurgical Bulletin,* v. 43, Feb. 1950, p. 74-87; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 53, 1950, p. 54-67.

Deals with binary alloys of Ti containing up to about 10% Cr, Co, Fe, Mn, Mo, Ni, and W. Method of production; results of transverse strength, tensile, and creep rupture tests; forgeability tests; metallography, deformation, and microstructure; and oxidation resistance. (Ti)

61-V. Vanadium and Its Alloys; A Review of Previous Work. W. B. Pearson. *Journal of the Iron and Steel Institute,* v. 164, Feb. 1950, p. 149-159.

The chemical and physical properties of vanadium, particularly in relation to the use of controlled atmospheres and refractory materials for containing the metal at high temperatures. Determinations of lattice constant. Four methods of preparing the metal. Alloy systems are described under three main headings: alloys with O_2, N_2, C, and H_2, the ferrovanadium alloys; and alloys with various other elements. 101 ref. (V)

62-V. Tantalum. G. L. Miller. *Murex Limited Review,* v. 1, no. 5, 1949, p. 88-96.

Occurrence, recovery, powder production, processing, properties, and applications. 18 ref. (Ta)

63-V. The Potentialities of Aluminium and Its Alloys for the Papermaking Industry. F. W. Rogers. *Proceedings of the Technical Section, Paper Makers' Association of Great Britain & Ireland,* v. 29, Dec. 1948, p. 383-404; discussion, p. 405-408.

Properties, behavior, working methods, and typical applications. (T29, Al)

64-V. Aluminum Bronze in the Foundry. (In Italian.) *Alluminio,* v. 18, Nov.-Dec. 1949, p. 635-657.

A comprehensive review of methods of production, casting, and heat treatment, and physicochemical properties of Al bronzes (5.0-15% Al, 0.5-5% Ni, 0.5-4% Mn, and 1.0-6.0% Fe, balance Cu). Optimum conditions of fabrication and application for each type. Physical, mechanical, and chemical properties are tabulated. (E general, Cu)

65-V. The Uses of Magnesium Alloys in Modern Industry. (In German.) W. Bulian. *Metall,* v. 3, Dec. 1949, p. 415-417.

Uses and limitations. Mechanical properties of 16 different alloys are tabulated. 20 ref. (T general, Q general, Mg)

66-V. Properties and Possible Uses of Lead-Arsenic Alloys in Comparison With Lead-Antimony Alloys. (In German.) O. Emieke. *Metall,* v. 4, Jan. 1950, p. 1-5; Feb. 1950, p. 48-53.

Comparative investigation of mechanical, structural, and fabrication properties of Pb-rich alloys of the above groups. Application for chemical-tank linings and for electrical and telephone cables. 15 ref. (T29, T1, Pb)

67-V. Lead Bronze as a Bearing Alloy. (In Czech.) Josef Valter. *Hutnické Listy,* v. 4, Dec. 1949, p. 381-386.

Properties and applications of various compositions. (SG-c, Cu)

68-V. Pure Nickel & Cupro-Nickel Alloys for Coinage. D. A. Ferguson. *Science & Engineering,* v. 2, Nov. 1949, p. 197-200.

History of coinage, desirable properties of coinage metals, resources of Ni and Cu-Ni alloys, properties, and forming procedures. (T10, Ni, Cu)

69-V. Chrome Magnet Steel. L. H. Seabright. *Iron Age,* v. 165, Mar. 16, 1950, p. 90-92.

Care in casting, working and annealing is needed for optimum magnetic characteristics and workability. Tests show importance of proper heat treatment of a 3.5% Cr steel. Hardness and effect of various factors on magnetic properties are tabulated. (J23, J26, P16, SG-n, AY)

70-V. Ferro-Alloys in 1949. R. G. Knickerbocker. *Journal of Metals,* v. 188, Mar. 1950, p. 476B-476D.

New technological and economic developments concerning the production and uses of Mn found in slags; recovery of low-grade Cr ores; and uses of exothermic alloys; and of Co, Ni, Mo, W, Cb, Ta, V, and Ti in the ferro-alloy industry. (B22, Fe)

71-V. Titanium Binary Alloys. C. M. Craighead, O. W. Simmons, and L. W. Eastwood. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Mar. 1950, p. 485-513.

Alloys of Ti with Ag, Pb, Sn, Ni, Cu, Be, B, Si, Cr, Mo, Mn, V, Fe, and Co were studied. Preparation of ingots. Tensile properties, minimum bend radii, hardnesses, response to heat treatments and aging treatment, and phase relationships. (Q general, M24, Ti)

72-V. Ternary Alloys of Titanium. C. M. Craighead, O. W. Simmons, and L. W. Eastwood. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Mar. 1950, p. 514-538.

Results of a preliminary study of 113 alloys. Structure and transformation range. Tensile properties, minimum bend radii, hardnesses, response to heat treatment and aging treatment, and phase relationships. (Q general, M24, Ti)

73-V. Quaternary Alloys of Titanium. C. M. Craighead, O. W. Simmons, and L. W. Eastwood. *Journal of Metals; Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, Mar. 1950, p. 539-552.

84 alloys from the systems Ti-Cr-C-N; Ti-Cr-C with Cu, V, Mo, Mn, Fe, or Ni; and Ti-Cr-N with V, Mo, or Ni were studied. Structure and transformation range; tensile properties; minimum bend radii, hardnesses, response to heat treatment and aging treatment, and phase relationships. (Q general, M24, Ti)

74-V. Nimonic Alloys. *Aircraft Production,* v. 12, Mar. 1950, p. 77-78.

Notes on the annealing and pickling of 75 and 75F and the hot working of 80 and 80A Ni alloys. (J23, L12, F general, Ni)

75-V. Report of the Commission on Boron Steels of the ISRID. Part I. Literature Review of Foreign Work on Steels Containing Very Small Amounts of Boron. (In French.) *Revue de Métallurgie,* v. 46, Dec. 1949, p. 859-868.

Effects of boron on various physical, mechanical, chemical, structural, and workability characteristics. 35 ref. (To be continued.) (AY, B)

76-V. (Book) **An Outline of Aluminum.** 64 pages. 1949. Aluminum Co. of America, Gulf Bldg., Pittsburgh.

History, mining, production, fabrication, properties, and applications. (A1)

77-V. (Book) **The Non-Ferrous Metal Industry in Germany During the Period 1939-1945.** Leslie Aitchison and Voya Kondic. 198 pages. 1949. His Majesty's Stationery Office, London (B.I.O.S. Surveys, Report No. 23).

Scientific, technical, and industrial information on German wartime activities in the nonferrous metals. (EG-a)

78-V. Castings in Nickel-Molybdenum and Nickel-Molybdenum-Chromium Alloys. W. H. Richardson. *Nickel Bulletin,* v. 23, Jan. 1950, p. 2-4.

Physical and mechanical properties and corrosion resistance of two high-Ni (56 and 63%) alloys. (P general, Q general, R general, Ni, SG-g)

79-V. Properties of Copper-Base Casting Alloys. *Foundry,* v. 78, Apr. 1950, p. 135-136.

Melting practice, physical and mechanical properties, workability and machinability, applications, etc. (Cu)

80-V. Phosnic Bronze—A New Copper-Base Alloy. Donald K. Crampton. *Wire and Wire Products,* v. 25, Mar. 1950, p. 228-230, 242-243.

Relatively new alloy developed by Chase Brass & Copper Co. Undisclosed percentages of Ni and P combine to form Ni phosphide which dissolves in Cu at high temperatures. On quenching and reheating, the Ni phosphide separates in extremely fine particles resulting in increased tensile strength, hardness, and stiffness. Electrical conductivity is about 60% of that of pure Cu. Comparative mechanical and physical properties. Applications are suggested. (Q general, P general, Cu)

81-V. New Cobalt-Base Alloy for High-Temperature Sheet. W. O. Binder and H. R. Spendelow, Jr. *Metal Progress,* v. 57, Mar. 1950, p. 321-326.

Superior high-alloy sheet, for use at temperatures up to 1800° F., based on Co (50%), Cr, Ni, and W. While

strong and stiff, it can be readily formed in bending, stamping, and drawing; has good weldability; and high resistance to oxidation. Optimum properties are developed by brief heating at 2200° F., followed by air cooling. (Co, SG-h)

82-V. Non-Heat-Treatable Wrought Aluminum Alloys. *Materials & Methods,* v. 31, Mar. 1950, p. 83.

Data sheet covers compositions; physical properties; mechanical properties; annealing temperature; hot-working temperature range; machinability; relative torch, inert-arc, and resistance weldability; resistance to atmospheric and chemical corrosion; available forms; and uses of 2S, 3S, 4S, 52S, and 56S alloys. (Al)

83-V. Thallium. Properties, Sources, Recovery, and Uses of the Element and Its Compounds. William H. Waggaman, Gladys G. Heffner, and Edwin A. Gee. *U. S. Bureau of Mines,* Information Circular 7553, Mar. 1950, 50 pages.

Mechanical, physical, and chemical properties. Analysis procedures. 369 ref. (Tl)

84-V. Nodular Cast Iron. G. Vennerholm, H. Bogart, and R. Melmoth. *Foundry Trade Journal,* v. 88, Mar. 9, 1950, p. 247-256.

Evaluation of the present state of development. Methods of manufacture, effect of composition on physical properties, and economic factors involved. A range of potential applications. (CI)

85-V. Nodular Graphite Cast Iron. Charles K. Donoho. *Product Engineering,* v. 21, Apr. 1950, p. 140-144.

Production, microstructures, mechanical properties, heat treatment, machinability, and applications. (CI)

86-V. And Now—Titanium Tubing. A. M. Bounds. *Iron Age,* v. 165, Apr. 6, 1950, p. 85-89.

Production using inert-atmosphere welding and annealing. Metallographic technique and weld microstructures. Mechanical properties and applications. (Ti)

87-V. Chambersburg Engineering Develops New Ductile Cast Iron. *Steel,* v. 126, Apr. 10, 1950, p. 86.

Mg added to a high-carbon cast iron transforms the graphite from the normal flake form to spheroidal form, resulting in high tensile strength and a substantial amount of ductility. Material retains self-lubricating properties and much of the vibration-dampening properties of flake-graphite cast iron. (Q23, CI)

88-V. A Preliminary Survey of Zirconium Alloys. C. T. Anderson, E. T. Hayes, A. H. Roberson, and W. J. Kroll. *U. S. Bureau of Mines,* Report of Investigations 4658, Mar. 1950, 48 pages.

Investigation to determine suitability for high-temperature applications. Preliminary study of 25 alloy systems with respect to preparation, fabrication, tensile properties, metallographic structures, constitution, and heat resistance. (Zr, SG-h)

89-V. Meehanite Nodular Iron Castings. V. I. Laverty. *Canadian Metals,* v. 13, Mar. 1950, p. 30-31.

Nodular irons produced by Meehanite foundries reveal characteristic properties produced by this process. Some examples of castings in this new metal. Tensile and hardness values are tabulated. (Q27, Q29, CI)

90-V. Some Heat-Treatable Copper-Rich Alloys. P. Mabb. *Metallurgia,* v. 41, Mar. 1950, p. 242-247.

A few of the more important types, including Al bronze, Be copper, Cr copper, and others. Phases and transformations, effects of alloying elements, heat treatments, pickling, mechanical properties, and fabrication. (Cu)

91-V. Commercial Production of Malleable Titanium and Zirconium. (In French.) W. J. Kroll. *Revue de Métallurgie,* v. 47, Jan. 1950, p. 1-18.

Methods of recovery. Physicochemical properties of the metal produced depending on the method of production. Present applications of the metals and future possibilities. 58 ref. (Ti, Zr)

92-V. German Ferrous Metal Industry. *Metal Progress,* v. 57, Apr. 1950, p. 508, 510, 512, 514, 516, 518, 520, 526, 528, 530, 534, 536, 538, 542, 544, 546, 548, 550. Abstracted from "The Ferrous Metal Industry in Germany During the Period 1939-1945", George Patchin and Ernest Brewin, *British Intelligence Objectives Subcommittee,* Overall Report No. 15.

Raw materials and their beneficiation, blast furnaces and their operation, ferro-alloys, steel production, and mechanical working (Simon Feigenbaum), foundry practice (C. K. Donoho), welding (W. L. Warner), and coatings (Adolph Bregman). (Fe)

93-V. The New Metals—Molybdenum, Titanium and Zirconium. *Welding Journal,* v. 29, Apr. 1950, p. 321-322; *Industrial Gas,* v. 27, Apr. 1950, p. 16.

Physical and mechanical properties, corrosion resistance, weldability, etc. (Mo, Ti, Zr)

94-V. Tungsten. E. L. Reed. *U. S. Atomic Energy Commission, AECD-2700,* Sept. 15, 1947, 107 pages.

Properties; fabrication; preparation; analysis; equilibrium studies with other elements and compounds; structural studies and changes in properties under exposure to radiation; and nuclear data. 110 ref.

95-V. High Conductivity Copper: The Froghall Works of Thomas Bolton & Sons, Ltd. W. E. Alkins. *Metal Industry,* v. 76, Mar. 24, 1950, p. 223-227; Mar. 31, 1950, p. 243-246.

Equipment and procedures, including refining, casting, wire drawing, annealing and pickling, and rolling. Final installment: Manufacture of rectangular, commutator, and strip copper. Other products of the company. (T1, SG-r, Cu)

96-V. Thermostatic Bimetals. (In French and German.) H. Bovet. *Pro-Metal,* v. 2, Dec. 1949, p. 511-520.

Principles, uses, production, and testing. (SG-s)

97-V. Titanium in Industry. (In German.) H. O. Nicolaus. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, Mar. 1, 1950, p. 153-160.

Reviews literature on the mining, ore dressing, and smelting of titanium ore; on the production of pure Ti and its properties; and on the alloying of Ti with other metals. 75 ref. (Ti)

98-V. (Book) **Les Aciers Fins et Speciaux Français.** (French Fine and Special Steels.) 300+ pages. 1949. S.P.A.S., 12 rue de Madrid, Paris, France. 770 fr.

A handbook prepared by the French Fine and Special Steel Producers' Assn. Essential information concerning these steels and their methods of production. (D general, ST)

99-V. (Book) **Rarer Metals.** Jack de Ment, H. C. Dake, E. R. Roberts, and R. Campbell Williams. 345 pages. 1949. Temple Press, Ltd., London. 25s.

The mineralogy, chemistry, physics, and technology of some of our less familiar metals — a compilation of basic data. The metals covered are: beryllium, gallium, indium, thallium, germanium, titanium, zirconium, hafnium, thorium, vanadium, columbium, tantalum, molybdenum, tungsten, uranium, selenium, tellurium, platinum, palladium, rhodium, iridium, osmium, ruthenium, lithium, rubidium, cesium, calcium, barium, rhenium, and boron. Chief difference between this English edition and its American counterpart is the addition of material on the rarer alkali metals, the alkaline-earth metals, boron, and rhenium. (EG-a, b, c, d, e, h, j)

100-V. Characteristics of MX Steel. George R. Caskey. *Western Metals,* v. 8, Apr. 1950, p. 21-25.

Mechanical properties, machinability, etc., of new freer machining bessemer screw stock developed by Carnegie-Illinois Steel Corp., which speeds production, increases tool life, improves finish, and reduces down-time. Composition corresponds to B-1113 grade. (Q general, G17, CN, SG-k)

101-V. General Controls at Glendale Cuts Costs—Ups Production With Freer Machining Steel. W. A. Ray. *Western Metals,* v. 8, Apr. 1950, p. 25.

Significant savings in production cost effected at General Controls Co., through use of MX bessemer steel. (CN, SG-k)

102-V. Techniques for Fabrication With Superalloys. Harley Rubish. *Western Metals,* v. 8, Apr. 1950, p. 34-35.

"Super-alloys" include both ferrous and nonferrous metals, development of which was begun early in World War II to permit manufacture of aircraft parts with superior strength properties at elevated temperatures. Properties of three typical groups are tabulated. Fabrication problems, and how they were solved by Stainless Steel Products, Inc. (SG-h)

103-V. Nodular Gray Iron Compared With Other Cast Ferrous Metals. G. Vennerholm, H. Bogart, and R. Melmoth. *Materials & Methods,* v. 31, Apr. 1950, p. 51-55.

Evaluates new irons, variously known as ductile, spheroidal, or nodular iron; indicates that they have a wide range of potential engineering applications, and in many cases can compete with steel and malleable castings. (CI)

104-V. Beryllium Copper. John T. Richards. *Materials & Methods,* v. 31, Apr. 1950, p. 75-90.

See abstract of "What Beryllium Copper Offers the Designer," *Machine Design,* item 23C-53, 1949. (Cu)

105-V. Wrought Phosphor Bronzes; Typical Properties. *Materials & Methods,* v. 31, Apr. 1950, p. 91.

Table lists composition; physical, mechanical and fabricating properties; corrosion resistance; available forms; and uses of four types. (Cu)

106-V. Recent Research in Light Alloys Performed in France. (In French.) G. Chaudron. *Revue de Métallurgie,* v. 47, Feb. 1950, p. 93-103.

Emphasis on Al and its alloys. 34 ref. (Al)

107-V. Industrial Cost Cutting With Cerro Alloys. O. J. Seeds. *Western Machinery and Steel World,* v. 41, Apr. 1950, p. 82-83.

Cerro alloys are low-temperature-melting alloys whose predominant component is bismuth. Several of the alloys are eutectics: Cerrobase is the eutectic of Bi and Pb; Cerrobend is the eutectic of Bi, Pb, Sn, and Cd; and Cerrotru is the eutectic of Bi and Sn. The noneutectics are: Cerrosafe (Bi, Pb, Sn, and Cd); and Cerromatrix (Bi, Pb, Sn, and Sb.) Physical properties and applications. (Bi, SG-d)

108-V. Characteristics and Properties of Cast Low Chromium-Molybdenum Steels. N. A. Ziegler, W. L. Meinhart, and J. R. Goldsmith. *Transactions of American Society for Metals,* v. 42, 1950, p. 175-204; discussion, p. 204-205.

Previously abstracted from Preprint. See item 3B-197, 1949.
(P general, Q general, K9, M27, CI)

109-V. Fabrication and Mechanical Properties of Ductile Zirconium. E. T. Hayes, E. D. Dilling, and A. H. Roberson. *Transactions of American Society for Metals,* v. 42, 1950, p. 619-640; discussion, p. 640.

Previously abstracted from Preprint. See item 3C-190, 1949.
(Q general, F general, G general, J23, Zr)

110-V. The Metallurgy of Beryllium. Albert R. Kaufmann, Paul Gordon, and D. W. Lillie. *Transactions of American Society for Metals,* v. 42, 1950, p. 785-844.

Part I: Methods for producing pure beryllium and techniques for melting and casting, extrusion and rolling on a commercial scale. Metallography, recrystallization and preferred orientations. Part II: Behavior under tensile stress both at room temperature and at high temperature. No explanation of the brittleness of beryllium was found. (Portion on metallography previously abstracted in *Metal Progress,* item 11-365, 1949.) 29 ref.
(C general, F general, M general, N5, Q23, Be)

111-V. Aluminum-Zinc-Magnesium Alloys; Their Development and Commercial Production E. H. Dix, Jr. *Transactions of American Society for Metals,* v. 42, 1950, p. 1057-1127.

1949 Edward de Mille Campbell Memorial Lecture. Metallurgical phases of the development and production of Alcoa 75S alloy, with particular emphasis on resistance to stress-corrosion cracking. 48 ref. (Partially abstracted from *Metal Progress,* item 6D-39, 1949.)
(R1, Al)

112-V. New Aluminum - Zinc - Magnesium-Copper Casting Alloys. W. E. Sicha and H. Y. Hunsicker. *American Foundrymen's Society,* Preprint No. 50-14, 1950, 9 pages.

Investigations have led to two new compositions: A612 (6.5% Zn, 0.7% Mg, 0.5% Cu, 0.15% Ti) for sand casting, and C612 (6.5% Zn, 1.0% Fe, 0.5% Cu, 0.35% Mn, 0.10% Ti) for permanent mold casting. Mechanical properties; aging, brazing, and casting characteristics; and resistance to corrosion and stress-corrosion cracking.
(E11, E12, Q general, K8, R general, Al)

113-V. Development of High-Strength Magnesium Casting Alloy ZK61. J. W. Meier and M. W. Martinson: *American Foundrymen's Society,* Preprint No. 50-43, 1950, 8 pages.

Investigation of experimental heat treatments to obtain maximum properties of alloy ZK61 (6% Zn and over 0.7% Zr). Comparison of mechanical properties of various ferrous and nonferrous casting alloys shows that ZK61 has the highest strength-to-weight ratio found in any commercial casting alloy. 29 ref.
(J general, Q general, Mg)

114-V. The Role of Nickel in Cast Bronze. G. S. Farnham. *Canadian Metals,* v. 13, Apr. 1950, p. 20-23, 49.

A survey. Table gives applications, mechanical properties, and chemical compositions of 27 types identified by Inco Specification Number. (Cu)

115-V. Some Properties of Tantalum. Rupert H. Myers. *Metallurgia,* v. 41, Apr. 1950, p. 301-304.

Results of experiments on effect of deformation and annealing on some mechanical and physical properties of Ta. The hardening of Ta when heated in an imperfect vacuum was studied. Deformation lowers softening temperature from 650 to 450° C., but has no effect on electrical resistivity. (Ta)

116-V. Contribution to the Study of the Stainless Ferrosilicons. (In French.) Robert Lefébure. *Métaux & Corrosion,* v. 25, Jan. 1950, p. 9-29; Feb. 1950, p. 44-53.

A comprehensive review including constitution diagrams of Fe-Si and compositions of stainless binary alloys. Methods of production and physical and chemical properties. Feb. installment shows that electrical resistance, magnetic sensitivity, and coefficient of expansion increase with concentration of Si.

Presence of other elements causes a decrease in these properties (except electrical resistance). 56 ref. (M24, P general, SS)

117-V. Electrolytic Manganese. (In French.) Ch. Tschappat. *Journal du Four Electrique et des Industries Electrochimiques,* v. 58, Nov.-Dec. 1949, p. 133-134; v. 59, Jan.-Feb. 1950, p. 15-17.

Transformations and crystal structure. Concluding installment describes U. S. installations for production of electrolytic manganese, and methods of operation. (N general, M26, C23, Mn)

118-V. Nodular Iron Finds Favor With Ford. *SAE Journal,* v. 58, May 1950, p. 31-34. Based on "Nodular Cast Iron", by Gosta Vennerholm, H. N. Bogart, and R. B. Melmoth. (To be published in full in *SAE Quarterly Transactions.)*

See abstract of "Nodular Gray Iron Compared With Other Cast Ferrous Metals", *Materials & Methods,* item 103-V, 1950. (CI)

119-V. Industrial Applications of Metamics. W. O. Sweeny. *Tool Engineer,* v. 24, May 1950, p. 21-23.

"Metamics" are metal-ceramic products made by Haynes Stellite Div., Union Carbide and Carbon Corp. Miscellaneous physical and mechanical properties, present and potential applications. Compositions are not given. (SG-h)

120-V. Titanium, Metal of the Future. *Mining Journal* (London), v. 234, Apr. 28, 1950, p. 421-422.

Properties, applications, ore resources, and methods of recovery. (Ti)

121-V. Fusible Alloys Containing Tin. 24 pages, Sept. 1949. *Tin Research Institute,* Fraser Rd., Greenford, Middlesex, England.

Composition, physical and mechanical properties, aging, corrosion, foundry practice, working, and uses of the tin that melt at relatively low temperatures. Does not include solders or amalgams. 19 ref. (Sn, SG-d)

122-V. (Book) Extraction and Fabrication of Aluminium. 115 pages. 1949. Northern Aluminium Co., Ltd., Banbury, Oxfordshire, England.

The first section deals with extraction—its historical associations, sources of Al ores and bauxite, mining and preparation of alumina, and details of the world's production of Al and bauxite. Part two covers the properties and part three fabrication of Al and its alloys, including remelting, pouring, cast structures, rolling sheet, hot rolling, annealing, cold rolling, finishing, extrusion, presses, heat treatment, drawing, forging, sand casting, die casting, etc. A final section briefly describes and illustrates varied uses. (Al)

123-V. (Book) Le Magnésium et les Alliages Ultra-Légers. (Magnesium and Ultra-Light Alloys.) Paul Bastien. 104 pages. 1948. Dunod, 92 rue Bonaparte, Paris 16, France.

Short but comprehensive review covering raw materials, methods of production, physical, chemical, and mechanical properties, phase relationships and transformations, foundry practice, fabrication, etc. 89 ref. (Mg)

124-V. A New High-Strength Aluminum Die-Casting Alloy. J. J. Warga, J. J. Preisler, and S. B. Ashkinazy. *Metal Progress,* v. 57, May 1950, p. 618-622.

In the example described, an Al alloy was desired that could be die cast and that would have elastic strength higher than any available Al die-casting alloy. The problem was solved by adding Si to an Al-Mg-Zn alloy that had been used previously in the form of investment castings. The specific application is the gimbal ring used in several gyroscopic instruments. (Q21, T8, E13, Al)

125-V. Metals and Refractories Combined in High-Temperature Structural Parts. John B. Campbell. *Materials & Methods,* v. 31, May 1950, p. 59-63.

Appraises the new high-temperature materials known variously as cermets, ceramals, or metal-ceramics. Physical and mechanical properties, and applications. (H general, SG-h)

126-V. Stainless Steels—Their Selection and Application. T. C. Du Mond. *Materials & Methods,* v. 31, May 1950, p. 83-98.

Manual tells what stainless steels are, their properties, and conditions governing their selection and application. (SS)

127-V. Wrought Coppers and Plain Brasses; Typical Properties and Uses. *Materials & Methods,* v. 31, May 1950, p. 99, 101.

Tables cover 9 types. (Cu)

128-V. Additions of Zirconium and Rare Earth Extend Magnesium's Range of Applications. W. D. Danks. *Modern Metals,* v. 6, May 1950, p. 34-36.

Properties and applications of "Z5Z"—4.5% Zn and 0.7% Zr; and "ZRE1"—2.5% Zn, 0.7% Zr, and 3.0% rare-earth metals. These alloys were developed for jet-propulsion engines,

but are said to be promising for other applications. (T25, Mg)

129-V. Ductile Cast Iron; A New Engineering Material. William H. Sparr. *Mines Magazine,* v. 40, May 1950, p. 25-29.

Production, structure and transformations, mechanical properties, and applications. (CI)

130-V. Cerium. L. Sanderson. *Canadian Mining Journal,* v. 71, May 1950, p. 71-72.

Sources, production of Ce alloys, and uses in the form of compounds and alloy ingredients, also as inoculants in refining of cast iron. (Ce)

131-V. Preliminary Research on Wrought Aluminum Bronzes Containing Beryllium. (In Italian.) C. Panseri. *Alluminio,* v. 19, No. 1, 1950, p. 9-17.

Results of experiments on nine new compositions. On the basis of micrographic and tensile tests, it appears that alloys containing 4.5-5% Al, 0.9-1.1% Be, Cu, remainder; and 6.5-7.0% Al, 0.3-0.4% Be, Cu remainder are promising. As additional elements, Ni and Ag are of principal importance. Corrosion resistance and workability were also evaluated. 10 ref.
(Q23, R general, M27, Cu)

132-V. Characteristics of "C46"—A New Heat Resistant Cast Light Alloy. (In Italian.) *Alluminio,* v. 19, No. 1, 1950, p. 59-69.

Details of physical, mechanical, and structural characteristics of Al alloy containing 10% Cu, 1% Si, 0.25% Mg, 0.15% Ti, and 1.5% Ni. (Q general, P general, M27, Al)

133-V. High Carbon Ferro Chromium. F. F. Franklin. *Vancoram Review,* v. 6, No. 3, 1950, p. 9-11.

Development, production, properties, and applications in refining of steels and cast irons. (Fe-n)

134-V. Ferro-Alloys in 1949. R. G. Knickerbocker. *Mining Engineering,* v. 187, June 1950, p. 663-665.

Previously abstracted from *Journal of Metals.* See item 70-V, 1950. (B22, Fe-n)

135-V. Type Metals and Their Care. William C. Otter. *American Pressman,* v. 60, May 1950, p. 30, 32, 34.

Compositions, properties, and impurities. Recommended procedures for remelting and drossing, including temperature controls.
(SG-e, Pb)

136-V. Extraction, Alloying and Fabrication of Magnesium. C. J. P. Ball. *Magnesium Review and Abstracts,* v. 3, Dec. 1949, p. 120-142.

Raw materials, electrolytic extraction processes, thermal production, alloying, melting, casting, fluxing, pouring, machining, corrosion, and uses. (Mg)

137-V. Strict Production Controls Assure Precision Manufacture of Welding Pipe Fittings. Phil R. Becker. *Steel,* v. 126, June 12, 1950, p. 95-98, 100.

Material specifications, metallurgy, machining, and welding operations required for producing piping installations which must be resistant to high pressures, temperatures, or corrosive substances. Carbon and stainless steel, wrought iron, Cr-Ni alloys, Ni, Al, and Monel are among the metals used.
(K general, SG-g, h, CN, SS, Fe-m, Ni, Al)

138-V. Speaking of Light Weight. George Kende. *Die Castings,* v. 8, June 1950, p. 21-23, 60, 66-67.

Magnesium die-cast components and their use. Design, ease of finishing, and machinability. (Mg)

139-V. Titanium Alloys. *Engineer,* v. 189, May 26, 1950, p. 630-631.

Preparation of binary, ternary, and quaternary alloys; their fabrication and properties. (Ei)

140-V. Zirconium and Its Compounds. A. E. Williams. *Mining Journal* (Annual Review Number), May 1950, p. 44-45, 47-49.

Production, properties, fabrication, and uses. (Zr)

141-V. New Aluminum Alloy Offers High As-Cast Properties. *Materials & Methods,* v. 31, June 1950, p. 61-62.

Physical and mechanical properties of "Almag 35". Use of high-purity Al results in a corrosion resistant casting alloy with exceptional strength, ductility and machinability without need for heat treatment. (Al)

142-V. Vanadium. J. Lomas. *Mine & Quarry Engineering,* v. 16, June 1950, p. 225-228.

Surveys ore reserves, recovery, properties, and applications, especially in ferro-alloys and alloy steels. (B10, V, AY, Fe-n)

143-V. Magnesium-Cerium Wrought Alloys for Elevated-Temperature Service. K. Grube, J. A. Davis, and L. W. Eastwood. *American Society for Testing Materials,* Preprint 30, 1950, 23 pages.

Experimental procedure includes melting and casting of alloys, scalping the billet to approximately 3 in. diam., extruding to ¾ in. diam., heat treating, and performing tension and short-time creep tests.
(Mg, SG-h)

144-V. Some Properties of Tantalum-Rich Alloys With Wolfram and Molybdenum. Rupert H. Myers. *Metallurgia,* v. 42, June 1950, p. 3-9.

Effects of tungsten and molybdenum on workability, ultimate tensile strength, hardness, electrical resistivity, work hardening rate, elongation rate, oxidation resistance, and temperature required for annealing. (Ta)

145-V. Steels for Screw Threads. (In French.) F. Hauth. *Revue de Métallurgie,* v. 47, Apr. 1950, p. 271-285; discussion, p. 285-286.

A résumé of the conclusions of the study by the Commission of Metallurgical Engineers in France. Particular emphasis is placed on specific compositions of such steels and the influence of alloying elements on machinability and mechanical properties. Heat treatment methods and schedules, ingot-casting practice, rolling practice, and their influence.
(Q general, G17, ST, SG-k)

146-V. A New Light Alloy of Medium Strength: Superalumag T.35. (In French.) Jean Herenguel. *Revue de l'Aluminium,* v. 27, Apr. 1950, p. 133-140.

From the series of ternary Al-Zn-Mg alloys the Company, Trefileries et Laminoirs du Havre, has selected a product containing 2.75-3.25% Zn and 1.50-1.75% Mg which is low compared with Zicral or Superalumag T.60. Known as T.35, this product is easily deformed, forged, or extruded. Self-tempering, it gives good results in weld seams; it can be anodized and has the corrosion resistance of the A-G series. 14 ref. (Al)

147-V. Nodular Iron's Record—Two Years Later. *Steel,* v. 127, July 17, 1950, p. 85-89, 100.

Performance data gradually being accumulated presage a strong role for nodular-graphite cast iron as an engineering material. Results of experimental work and some facts as to how the new material stands up under service conditions are summarized. Experiences of ten U. S. companies. (CI)

148-V. Commercial Uses of Magnesium in Germany. Part I. E. J. de-Ridder. *Modern Metals,* v. 6, June 1950, p. 25-28.

Three-part report deals with the research and development work on Mg alloys carried out at the I. G. Farben plant at Bitterfeld, Germany. (To be continued.) (Mg)

149-V. Where Is Cast Iron Going To? P. A. Russell. *Foundry Trade Journal,* v. 88, June 29, 1950, p. 697-702.

Development of nodular iron and its present and potential applications. Mechanical properties and microstructures. (CI)

150-V. More Zirconium Coming Up! *Steel,* v. 127, July 24, 1950, p. 63-64, 76.

Flow sheet for continuous process developed by Bureau of Mines for reducing anhydrous zirconium chloride with Mg under He. Present and potential uses (fluorescent lights, steel desulfurizer and deoxidizer, cast-iron graphite nodulizing agent, etc.) Heat resistance in various atmospheres. (C26, Zr)

151-V. Titanium and Its Alloys. A. E. Williams. *Mining Journal,* v. 235, July 7, 1950, p. 10-13.

Resources; methods of preparation; and uses in ferrotitanium, steel, cast iron, and nonferrous alloys. (Ti)

152-V. Properties and Uses of Thallium. H. E. Howe and A. A. Smith, Jr. *Journal of the Electrochemical Society,* v. 97, Aug. 1950, p. 167C-170C.

A review. 67 ref. (Tl)

153-V. Nodular Cast Iron. Gosta Vennerholm, H. N. Bogart, and R. B. Melmoth. *SAE Quarterly Transactions,* v. 4, July 1950, p. 422-435; discussion, p. 436-437.

Methods of making nodular iron, effect of composition on physical properties, economic factors involved, and potential applications. (CI)

154-V. A Cast Iron That Bends. Albert G. Zima. *Western Machinery and Steel World,* v. 41, July 1950, p. 74-75.

Properties and applications of nodular iron. (CI)

155-V. The Present Status of Titanium Metal. Felix B. Litton. *Foote Prints,* v. 22, no. 1, 1950, p. 10-16.

Occurrence, methods for treating ilmenite for producing titanium dioxide, titanium metal production, research activity, and mechanical and physical properties. (Ti)

156-V. Nodular Iron—A Bibliography. F. R. Morral. *American Foundryman,* v. 18, July 1950, p. 61-64.

135 references. Illustrations show nodular graphite of various types as viewed through the microscope by natural and polarized light, and as seen in the electron microscope. (CI)

157-V. Some Properties and Applications of Spheroidal-Graphite Cast Iron. A. B. Everest. *Institute of British Foundrymen,* Paper No. 963, 1950, 11 pages (Advance Copy).

Various types, their mechanical and physical properties, and applications. 11 ref. (CI)

158-V. Thermal Shock No Problem for New Metal-Ceramic. *Steel,* v. 127, Aug. 7, 1950, p. 88-89.

See abstract of "Industrial Applications of Metamics", by W. O. Sweeny, *Tool Engineer,* item 119-V, 1950. (SG-h)

159-V. Zinc Alloy as Strong as Brass. *Journal of Metals,* v. 188, Aug. 1950, p. 983.

A new alloy composed principally of Zn with small quantities of Cu and Be added, is said to have approximately the same strength and electrical properties as brass. Suggests applications. (Q23, P15, Zn)

160-V. Refractory and Wear-Resistant Parts Made From New Silicon Carbide Material. *Steel,* v. 127, Aug. 14, 1950, p. 91-92. Based on paper by C. G. Rose.

Versatile new refractory material composed of a dense network of silicon carbide embedded in a matrix of silicon which may find wide use in refractory, electrical conductivity or corrosion resistant applications. (C, SG-g, h, m, r)

161-V. Tungsten. E. L. Reed. *U. S. Atomic Energy Commission,* AECD-2700, Sept. 15, 1947, 54 pages.

Properties, fabrication, analysis, equilibrium studies with other elements and compounds, structural studies and property changes under exposure to radiation, and nuclear data. 111 ref. (W)

162-V. Spheroidal-Graphite Cast Iron; Some Properties and Applications. A. B. Everest *Foundry Trade Journal,* v. 89, July 20, 1950, p. 57-64; July 27, 1950, p. 95-97; discussion, p. 97-102.

Published figures and new data now available from practical experience with the magnesium process gained in the laboratories of Mond Nickel Co. and in their foundries. New information on some of the more specialized properties of spheroidal-graphite cast iron. Second installment deals with applications. 11 ref. (CI)

163-V. Lead Alloys. (In German.) Josef Blanderer. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 3, June 1950, p. 190-195.

Pb-Sb alloys; Pb-Sb-Sn alloys, especially type metals; Pb bearing metals and ways of improving them by adding alkali or alkaline-earth metals; solders: and production and purification. (Pb, SG-c,e,f)

164-V. German Advances in Heavy Nonferrous Metals. *Metal Progress,* v. 58, Aug. 1950, p. 220, 222, 224, 228, 230, 232. Condensed from "Nonferrous Metal Industry in Germany, 1939-1945", BIOS Report No. 23.

Based on comprehensive analysis of over 400 documents concerning activities in Cu, Pb, Zn, and associated metals. (EG-a)

165-V. Modern Cast Iron. M. M. Hallett. *Journal of the Birmingham Metallurgical Society,* v. 30, June 1950, p. 44-62.

Compositions, properties, and applications of corrosion resisting, heat resisting, wear resisting, and high-strength cast irons. (CI)

166-V. Production & Properties of Cobalt; Increasing Applications of a Versatile Element. R. S. Young. *Chemical Age,* v. 63, Aug. 5, 1950, p. 193-195.

Recovery and uses, as metal, and in the form of compounds. (Co)

167-V. Report on the Work of the Tin Research Institute 1949. The Institute (England), 1950, 16 pages.

Reports work on tin plate, hot-tinning, bearing metals, bronze, solder. electrotinning, Sn-Zn and Sn-Pb coatings, speculum plate, other Sn-alloy coatings, and on corrosion. Includes data on staff, committees, publications, exhibitions, etc. (Sn)

168-V. Bismuth. J. Lomas. *Mine & Quarry Engineering,* v. 16, Sept. 1950, p. 289-292.

Ore deposits, resources, beneficiation, metal production, properties, applications, etc. (Bi)

169-V. Properties of Niobium. J. Lomas. *Canadian Mining Journal,* v. 71, Aug. 1950, p. 54-55.

Resources, miscellaneous properties, alloys, and uses of niobium, usually known as columbium. (Cb)

170-V. Industrial Value of Bismuth; Expanding Range of Metallurgical Applications. *Chemical Age,* v. 63, Aug. 19, 1950, p. 258. Condensed from *South African Mining and Engineering Journal,* v. 61, Part 1.

(Bi)

171-V. Two New Titanium Alloys Now in Production. D. I. Brown. *Iron Age,* v. 166, Sept. 14, 1950, p. 85-88.

High-strength 7% Mn alloy for sheet applications and a 4% Mn, 4% Al alloy for high-strength forging and bar applications. The alloys are transformation hardening and of the two-phase type. The sheet grade has a minimum yield strength of 130,000 psi. Welding characteristics. (Ti)

172-V. Another View of Nodular Cast Iron. C. E. Herrington. *Product Engineering,* v. 21, Sept. 1950, p. 214, 216, 218.

Refers to article by Charles K. Donoho (Apr. issue, item 85-V). Limitations and present gap between experimental results and commercial development. Believes that further development work is required before nodular iron can be classed as a fully proven engineering material. (CI)

173-V. High Temperature Alloys Based on Titanium Carbide. E. M. Trent and J. Bateman. *Metallurgia,* v. 42, Aug. 1950, p. 111-115.

Reviews and correlates the literature. The low specific gravity of alloys containing a large proportion of TiC makes them particularly suitable for turbine rotor blades. Physical and mechanical properties and microstructures of various compositions. (Ti. SG-h, j)

174-V. Vanadium Metal—A New Article of Commerce. A. B. Kinzel. *Metal Progress,* v. 58, Sept. 1950, p. 315-321, 344B.

Research program on production, fabrication, properties, and engineering possibilities of high-purity vanadium at Electro-Metallurgical Div., Union Carbide and Carbon Corp. Present status and future prospects. Data sheet tabulates and charts physical and mechanical properties, also corrosion resistance. (V)

175-V. Metallurgy of Zirconium. *Metal Progress,* v. 58, Sept. 1950, p. 380, 382, 384. Extracts from "Research Activities of the Bureau of Mines in the Northwestern States", by H. A. Doerner.

Properties and process developed for production of ductile Zr, from Zircon sand to primary forms. (Zr)

176-V. Binary Alloys of Hydride Titanium. *Metal Progress,* v. 58, Sept. 1950, p. 384, 386, 388. Condensed from "A Study of Some Alloys of Titanium, in the Manufacture of Which Commercial Titanium Hydride Powder Was Used", W. E. Kuhn, H. V. Kinsey, and O. W. Ellis.

Previously abstracted from *Canadian Mining and Metallurgical Bulletin; Transactions of the Canadian Institute of Mining and Metallurgy.* See item 60-V, 1950. (Ti)

177-V. Zirconium—Once a Rare Metal, It Is Now Ready for Commercial use. A. H. Roberson and W. W. Stephens. *Modern Metals,* v. 6, Sept. 1950, p. 36-38.

Ore resources, recovery, fabrication, properties, and applications. (Zr)

178-V. They're Putting the Saddle on Titanium. *Steel Horizons,* v. 12, Fall 1950, p. 3-5, 26.

Production, properties, present and potential applications. (Ti)

179-V. Binary Copper - Beryllium Casting Alloys. Vaughn D. Hildebrandt. *American Foundryman,* v. 18, Sept. 1950, p. 34-37.

Alloys investigated with respect to tensile strength, hardness, elongation, and microstructures represent the useful range of the high-strength alloys (1.78-2.82% Be). Survey of the results shows that the properties obtainable from the pure Cu-Be alloys are slightly inferior to those containing Co and/or Ni. (Q general, Cu)

180-V. How To Select and Use Low-Melting Alloys as Production Aids. O. J. Seeds. *Materials & Methods,* v. 32, Sept. 1950, p. 64-68.

Compositions and melting points of 21 Bi alloys plus pure Bi, Pb, Sn, Cd, Sb, In, and Zn. Mechanical and physical properties of eight of the "Cerro" series. Other properties; also varied applications. (Bi, SG-d)

181-V. Wrought Tin and Aluminum Brasses; Typical Properties and Uses. *Materials & Methods,* v. 32, Sept. 1950, p. 85.

A data sheet. (Cu)

182-V. Nickel-Chromium-Molybdenum Steels. *Materials & Methods,* v. 32, Sept. 1950, p. 87.

Data sheet gives compositions of four types (4317, 4320, 4337, and 4340); their physical, mechanical, and fabricating properties; corrosion resistance; available forms; and uses. (AY)

183-V. Choice of Aluminum Alloys; Procedures To Be Adopted in Testing. *Chemical Age,* v. 63, Sept. 2, 1950, p. 333-335. Condensed from "Aluminium Alloy Castings," *Aluminium Development Association,* 33 Grosvenor St., London W. 1, England.

Choice of alloys, including mechanical properties, solidification shrinkage, fluidity, corrosion resistance, and protection by anodizing and electroplating. Inspection procedures. (Al)

184-V. Development and Status of the Stainless Rolling and Forging Steels. (In German.) Karl Bungardt. *Stahl und Eisen,* v. 70, July 6, 1950, p. 582-596.

Reviews literature (domestic and foreign) on production, composition, and properties. 75 ref. (SS)

185-V. Development and Status of the Stainless Cast Steels. (In German.) Karl Roesch. *Stahl und Eisen,* v. 70, July 6, 1950, p. 596-606; discussion, p. 606-607.

Development in Germany and

other countries. Sorbitic, ferritic, and austenitic cast steels, their resistance to corrosion and strength properties; also special Ni-Mo base alloys (Hastelloys), mainly used where resistance to H_2SO_4 and HCl is required. 29 ref.
(R general, SS, Ni)

186-V. Uses of the Rare Metals. (In German.) H. Blumfeldt. *Metall,* v. 4, July 1950, p. 300-303.

Outlines mechanical and physical properties, occurrence, and uses of each of the following: Li, Be, Na, Cu, Ti, Ga, Ge, Rb, Zr, Cb, Ru, Rh, Pd, Cd, In, Cs, Ba, Ce, Ta, Re, Os, Ir, Tl, and Bi. (EG-b)

187-V. New Developments in Magnetic Materials. (In German.) Hermann Fahlenbrach. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, July 21, 1950, p. 565-570.

Reviews literature on hard and soft magnetic materials, and on magnetic alloys for special purposes. Compositions, production, magnetic properties, and uses. 38 ref.
(SG-n, p)

188-V. General Method for Production of the Cupro-Aluminums. (In French.) Marcel Cirou. *Fonderie,* July 1950, p. 2131-2132.

Different types of Cu-Al alloys and methods for their commercial production. Copper content is usually 80-90%. (Cu)

189-V. Wrought Copper and Copper-Base Alloys. C. L. Bulow. *Industrial and Engineering Chemistry,* v. 42, Oct. 1950, p. 1970-1977.

Reviews literature of past year on properties, fabrication, and applications. 158 ref. (Cu)

190-V. Iron, Mild Steels, and Low-Alloy Steels. C. P. Larrabee and S. C. Snyder. *Industrial and Engineering Chemistry,* v. 42, Oct. 1950, p. 1986-1990.

Reviews literature on new developments of past year. 37 ref.
(CI, ST)

191-V. Nickel and High-Nickel Alloys. H. O. Teeple. *Industrial and Engineering Chemistry,* v. 42, Oct. 1950, p. 1990-2001.

Reviews literature of past year on properties, fabrication, and applications. 303 ref. (Ni)

192-V. Stainless Steels and Other Ferrous Alloys. W. B. DeLong and P. H. Permar. *Industrial and Engineering Chemistry,* v. 42, Oct. 1950, p. 2009-2019.

Reviews miscellaneous literature of the past year. "Other ferrous alloys" covered are the high-Si irons and the austenitic Mn steels and Fe-Ni alloys. 238 ref. (SS, AY, Fe)

193-V. Tin and Its Alloys. Robert J. Nekervis. *Industrial and Engineering Chemistry,* v. 42, Oct. 1950, p. 2020-2022.

Fundamental and applied developments of the past year. 102 ref.
(Sn)

194-V. Less Common Metals. D. B. Broughton. *Industrial and Engineering Chemistry,* v. 42, Oct. 1950, p. 2023-2025.

Reviews literature of past year on Ti, Zr, Ta, and the noble metals. 48 ref. (Ti, Zr, Ta, EG-c)

195-V. Pure Vanadium Now in Limited Production. *Iron Age,* v. 166, Oct. 5, 1950, p. 95-96.

Method of production, fabrication, and properties of 99.8%-pure ductile V, now commercially available in the form of ingots, springs, rings, tubes. (V)

196-V. Production and Application of Stellites. G. L. White. *Canadian Metals,* v. 13, Sept. 1950, p. 30-31, 48.

Production practice including melting, pouring and precision casting; grinding; hard facing; and rolling.
(T general, E15, G18, L24, SG-j, Co)

197-V. Aluminum Alloys—1940 to 1950. E. H. Dix, Jr. *Metal Progress,* v. 58, Oct. 1950, p. 484-489.

New developments. Compositions and mechanical properties; special applications.
(T general, Q general, Al)

198-V. Midcentury Review of Progress in S.A.E.-A.I.S.I. Alloy Steels. John Mitchell. *Metal Progress,* v. 58, Oct. 1950, p. 491-496, 497-498, 562.

Surveys the above from 1890 to date. Automotive and other uses of the alloy types available during each period. (A4, T general, AY)

199-V. Gas Turbine Alloys, 10 Years Later. Howard Scott. *Metal Progress,* v. 58, Oct. 1950, p. 503-511, 544.

Past, present, and future of high-temperature alloys for gas turbines. Tables give nominal compositions, temperature ratings, trade names, development organizations, and recommended heat treatments. Present deficiencies and future requirements. (T25, SG-g,h)

200-V. A Review of Productive Capacity in the Magnesium Industry. J. D. Hanawalt. *Metal Progress,* v. 58, Oct. 1950, p. 512-518, 530.

Economic data (production and prices) over the past 20-25 years. Technological and fundamental developments, also applications and design. (A4, Mg)

201-V. New Zinc Alloy. *Metal Progress,* v. 58, Oct. 1950, p. 558-560. Translated and condensed from "A Zinc

Alloy of High Aluminum Content", Erich Gebhardt.

Previously abstracted from *Metallforschung;* see items 3c-122, 6d-26, and 6c-51, 1948. (Zn)

202-V. New Structural Metals. J. J. Harwood. *Product Engineering,* v. 21, Oct. 1950, p. 96-102.

Production, properties, fabrication, processing, and applications of Ti, Zr, and Mo. (Ti, Zr, Mo)

203-V. (Book) **Indium.** Maria Thompson Ludwick, compiler. 276 pages. 1950. Indium Corp. of America, 60 E. 42 St., New York 17, N. Y. $7.50.

Discovery, occurrence, development, physical and chemical characteristics. Presents an annotated bibliography (203 pages) covering 1863-1949 inclusive. (In)

204-V. Latest Advances in Cast Iron Field. Richard Schneidewind and R. G. McElwee. *Automotive Industries,* v. 103, Oct. 15, 1950, p. 42-43, 90, 92.

New developments in foundry practice and compositions. Properties and applications. (E general, CI)

205-V. How To Work Tool and Die Steels. Part I. Anderson Ashburn. *American Machinist,* v. 94, Oct. 16, 1950, p. 145-160.

Special report. Classification and properties; selection; forging; heat treatment; testing; and machining. (TS)

206-V. Zirconium Offers Interesting Properties and Possibilities. *Materials & Methods,* v. 32, Oct. 1950, p. 63-64.

Properties, present and potential applications. (Zr)

207-V. Iron-Base Heat Treatable Alloy Has Good High Temperature Strength. E. F. Losco. *Materials & Methods,* v. 32, Oct. 1950, p. 65-69.

Originally designed for gas turbine disks, Discaloy has found use for many other high and room-temperature applications. Nominal composition is 54.0% Fe, 26.0% Ni, 13.5% Cr, 3.2% Mo, 1.6% Ti, 0.7% Mn, 0.8% Si, 0.1% Al, and 0.03% C. Miscellaneous properties, heat treatment, weldability, workability, machinability, applications, etc. (SS, SG-h)

208-V. Heat Resistant Castings—Their Selection and Application. H. R. Clauser. *Materials & Methods,* v. 32, Oct. 1950, p. 79-90.

Manual gives comprehensive picture of standard types and grades of heat resistant alloys. General composition, high-temperature strength properties, corrosion resistance, special service properties, and processing characteristics of the alloys. General types of applications for which each grade alloy is best suited. (SS, SG-h)

209-V. Cast Zinc Alloys. Typical Properties. *Materials & Methods,* v. 32, Oct. 1950, p. 91.

A data sheet. (Zn)

210-V. Wrought Zinc Alloys; Typical Properties. *Materials & Methods,* v. 32, Oct. 1950, p. 93.

A data sheet. (Zn)

211-V. How To Select the "Right" Cast Heat Resistant Alloy. N. A. Matthews. *Steel,* v. 127, Nov. 6, 1950, p. 90-92, 94, 104, 106.

Includes physical and mechanical data. (SG-h)

212-V. Elektron Magnesium-Zirconium Alloy Progress. C. J. P. Ball. *Magazine of Magnesium,* Nov. 1950, p. 8-11. Tensile compressive proof stress, and fatigue properties and applications of the British "Elektron" alloys. (T general, Q27, Q7, Mg)

213-V. Spheroidal-Graphite Cast Iron. *Nickel Bulletin,* v. 23, July 1950, p. 118-121.

A wide variety of castings of the above type made in 5 different countries. (T general, CI)

214-V. Making Aluminium-Bronze Alloys. Marcel Cirou. *Foundry Trade Journal,* v. 89, Oct. 26, 1950, p. 349-350. Translated from *Fonderie.*

Previously abstracted from original. See item 188-V, 1950. (Cu)

215-V. The Properties of Aluminium and Its Alloys, and Some of Their Applications. J. C. Bailey and D. C. G. Lees. *Transactions of the Indian Institute of Metals,* v. 1, Apr. 1949, p. 135-159; discussion, p. 160-161.

An illustrated survey. (T general, Al)

216-V. Use of Aluminium Alloys in Structures. K. F. Antia. *Transactions of the Indian Institute of Metals,* v. 1, Apr. 1949, p. 181-203; discussion, p. 203-204.

Economic considerations; pertinent mechanical, physical, and corrosion properties; methods of fabrication; specifications, etc. (T26, Al)

217-V. Developments in the Application of Aluminium Alloys to Structures. D. V. Pike. *Transactions of the Indian Institute of Metals,* v. 1, Apr. 1949, p. 205-232.

Includes properties, fabrication, design and erection. (T26, Al)

218-V. Development of Chromium-Manganese Stainless Steels Using High-Purity Electrolytic Manganese for Alloying. D. N. Dhanbhoora and J. S. Vatchagandhy. *Transactions of the Indian Institute of Metals,* v. 3, 1949, p. 309-331.

Effect of replacing, wholly or in part, the Ni in 18-8 Cr-Ni austenitic stainless steel by high-purity Mn. A series of alloys with varying C, Ni,

and Mn contents were prepared and forged into bars. A study was made of the microstructures of these alloys and the results correlated with knowledge gained from a study of phase diagrams of the ternary Fe-Cr-Mn system. Corrosion resistance of the alloys to atmospheric conditions, salt spray, HNO_3, H_2SO_4, intergranular attack, and high-temperature oxidation compared with that of a standard 18-8 stainless steel. Physical properties of the alloys. Concludes that low-carbon 18% Cr steels containing 4-12% Mn and 0-4% Ni have considerable promise. 11 ref. (Q general, R general, M27, SS)

219-V. The Evolution of Cast Iron in 25 Years. (In French.) Marsel Ballay and Raymond Chavy. "International Gieterij Congres 1949—Amsterdam", p. 55-64.
(E general, CI)

220-V. Magnesium (Elektron) Casting Alloys. (In English.) L. J. G. Van Ewijk. "International Gieterij Congres 1949—Amsterdam", p. 79-87, 88; discussion, p. 87.
Corrosion resistance, fire risk, mechanical properties, and foundry technique. 10 ref.
(R general, Q general, E general, Mg)

221-V. The Present Status of Cast Iron. (In German.) Adalbert Wittmoser. *Stahl und Eisen,* v. 70, Sept. 14, 1950, p. 813-827; discussion, p. 828.
Reviews literature on the different types of cast iron. Compositions, structures, properties, heat treatments, and uses. 108 ref. (CI)

222-V. The Problem of Reducing the Nickel and Copper Contents of Al-Cu-Ni Aluminum Alloys. (In German.) Lisl Koch. *Metall,* v. 4, Oct. 1950, p. 427-428.
Studies were made on an alloy containing 4% Cu, 2% Ni, 1.5% Mg, remainder Al, to determine to what extent Cu and Ni can be replaced by other metals without impairing mechanical properties of the alloys. Results show that addition of 1.4% Fe permits reduction of Ni from 2 to 1.3%; that Si cannot replace Cu; but that an increased Mg content permits reduction of Cu by 1.5%. Data are tabulated. (Al)

223-V. The Plastic Mold Steels—Their Selection and Treatment. Lester F. Spencer. *Tool Engineer,* v. 25, Nov. 1950, p. 20-23.
Compositions, heat treatments, Cr plating, and applicabilities. (TS)

224-V. Cast Irons Containing Spheroidal Graphite. (In French.) J. B. Guillaumin. *Métaux et Industries,* v. 1, no. 1, 1950, p. 11-13.
Differences in structure and mechanical properties between spheroidal and ordinary cast iron. Method of production and applications. (CI)

225-V. Characteristics, Properties, and Applications of the Alloy Duralite (Termafond C3-INA). (In Italian.) *Alluminio,* v. 19, no. 4, 1950, p. 357-368.
The alloy has a nominal composition of 3.0% Cu, 1.5% Fe, 0.6% Mg, 0.6% Ni, 0.7% Si, 0.15% Ti, and remainder Al. Physical and mechanical properties, microstructure, thermal treatments, fabrication, and applications, under different conditions of preparation. 13 ref. (Al)

226-V. Conference on Stainless Steels. (In Russian.) *Vestnik Akademii Nauk SSSR* (News of the Academy of Sciences of the USSR), Aug. 1950, p. 66-71.
Briefly reviews 16 reports. Among the topics are nature of corrosion resistance, intercrystalline corrosion, stress corrosion, corrosion by dilute H_2SO_4, manufacture of stainless steel, chromizing of iron and steel, diffusion coating with stainless steel, deep drawing of stainless steel, and electropolishing and etching of stainless steel. (R general, L general, SS)

227-V. (Book) **Steel Castings Handbook.** Rev. ed. 522 pages. 1950. Steel Founders' Society of America, 920 Midland Bldg., Cleveland 15, Ohio. $4.00.
A complete revision of the original volume. Information on types of steel castings, specifications, design considerations, applications, mechanical and physical properties of cast steel, and other technical data covering virtually every facet of the industry, its products, processes, history, and outlook. Recommendations for purchasers of steel castings. Thoroughly indexed. (CI)

228-V. (Book) **The Machining and Manipulation of Stainless Steels.** W. F. Walker. 78 pages. 1950. Emmott & Co., Ltd., 31 King St. West, Manchester 3, England. 3s, 6d. (*Mechanical World* Monograph No. 57.)
Includes information on miscellaneous fabrication processes such as welding, working, and heat treatment, as well as machining.
(G17, SS)

229-V. Titanium Data. *Aviation Week,* v. 53, Nov. 20, 1950, p. 38-39.
Results of work on mechanical and fabrication properties done for the U. S. Air Force's Air Materiel Command by Battelle Memorial Institute; and on the Kroll method for production of Ti by U. S. Bureau of Mines. (Ti)

230-V. The Titanium Program at the U. S. Naval Experiment Station. W. Lee Williams. *Journal of the American Society of Naval Engineers,* v. 62, Nov. 1950, p. 855-869.
Types of titanium; fatigue prop-

erties; marine-corrosion properties; cavitation resistance. 15 ref. (Q7, R2, Ti)

231-V. High Alloy Weldments for Heat and Corrosion-Resistant Applications. Paul Goetcheus. *Industrial Heating,* v. 17, Nov. 1950, p. 1928, 1930, 1932, 2052-2053.

Second of series on heat and corrosion resistant materials. Deals with AISI Types 309, 310, 330, and related stainless steel compositions. Design recommendations for welding these alloys. (K general, SG-g, h)

232-V. How To Work Tool and Die Steels. *American Machinist,* v. 94, Dec. 11, 1950, p. 147-162.

Classified list of 800 tool and die steels based on SAE and JIC methods with names of suppliers, compositions, typical properties, applications, and basic heat treatment data. (TS)

233-V. Nodular Cast Iron—Literature Report No. 10. B. S. Srikantiah and B. R. Nijhawan. *Journal of Scientific & Industrial Research,* v. 9, Oct. 1950, p. 364-366.

Surveys 8 recent publications (1947-49). (CI)

234-V. Zirconium. G. L. Miller. *Industrial Chemist and Chemical Manufacturer,* v. 26, Oct. 1950, p. 435-441.

Early methods of preparing Zr, commercial production, and properties and applications of the metal. (Zr)

235-V. Properties and Usage of Copper and Its Alloys. W. H. Dennis. *Mine & Quarry Engineering,* v. 16, Dec. 1950, p. 381-385. (Cu)

236-V. Properties and Fabrication of Aluminium. E. G. West. *Aluminium Development Association,* "Proceedings at a Symposium on Aluminium in Road Transport", 1950, p. 46-67.

Alloy types, properties, working characteristics, joining, and surface finishing. 26 ref. (Al)

237-V. Twenty-One Years of Progress in Special Steels. D. A. Oliver and J. S. Bristow. *Metallurgia,* v. 42, Nov. 1950, p. 279-282.

A review. (ST, AY)

238-V. Carbon and Low Alloy Steels. I. M. Mackenzie. *Metallurgia,* v. 42, Nov. 1950, p. 282-284.

Review developments during the past 21 years. (CN, AY)

239-V. A Review of the Developments in the Metallurgy of Cast Iron. J. E. Hurst. *Metallurgia,* v. 42, Nov. 1950, p. 289-292.

Reviews developments of past 20 years. (CI)

240-V. Changes in the Non-Ferrous Metals Industry. William H. Henman. *Metallurgia,* v. 42, Nov. 1950, p. 297-299.

Reviews developments of past 21 years. (EG-a)

241-V. Copper During *Metallurgia's* Lifetime. E. Voce. *Metallurgia,* v. 42, Nov. 1950, p. 299-302.

Reviews progress since 1929 (date of first publication of *Metallurgia.)* (Cu)

242-V. Nickel and Nickel Alloys; A Review of Progress Since 1929. *Metallurgia,* v. 42, Nov. 1950, p. 302-307. (Ni)

243-V. Tin and Its Alloys. John Ireland. *Metallurgia,* v. 42, Nov. 1950, p. 307-310.

Reviews developments of past 21 years. (Sn)

244-V. Progress in the Precious Metals. J. C. Chaston. *Metallurgia,* v. 42, Nov. 1950, p. 310-313.

Reviews progress of past 21 years in Au, Ag, Pt and the 5 other "platinum metals". (Au, Ag, Pt, EG-c)

245-V. 21 Years of Progress in the Zinc Industry. *Metallurgia,* v. 42, Nov. 1950, p. 313-316, 352-353.

A review. (Zn)

246-V. The Aluminium Industry, 1929-1950. W. C. Devereux. *Metallurgia,* v. 42, Nov. 1950, p. 317-320.

A review. (Al)

247-V. Magnesium and Magnesium Alloys, 1929-1950. F. A. Fox. *Metallurgia,* v. 42, Nov. 1950, p. 325-328, 333.

Surveys progress. (Mg)

248-V. (Pamphlet) **Bibliography—Nodular Iron.** C. C. Reynolds and B. F. Brown. 1950, 13 pages. *Massachusetts Institute of Technology,* Cambridge, Mass.

Covers 1949-50. Includes scattered references back to 1929. 206 ref. (CI)

249-V. (Book) **Selection and Hardening of Tool Steels.** L. H. Seabright. McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. $5.00.

Designed to aid in more accurate and scientific selection of the right toolsteel for a given job, this manual gives a classification of steels according to uses and chemical compositions, and shows the relationship of properties of one steel to another. Classifies toolsteels into 12 main groups, according to type of job to be performed and physical properties desired. The 12 groups are further broken down into 46 sub-groups according to chemical composition. Chemical analyses of 950 toolsteels are listed. (T6, J26, TS)

ADDRESSES OF PUBLICATIONS

I. English Language Journals

A

Acoustical Society of America, Journal, American Institute of Physics, 57 E. 55th St., New York 22, N. Y.

Acta Chemica Scandinavica (mostly English), Einar Munksgaard, Norregade 6, Copenhagen, Denmark.

Acta Crystallographica (mostly English), Cambridge University Press, Bentley House, Euston Rd., London N.W.1, England; or American Institute of Physics, 57 E. 55th St., New York 22, N. Y.

Acta Polytechnica (mostly English), Royal Institute of Technology, Stockholm, Sweden.

Aero Digest, Aeronautical Digest Publishing Corp., 515 Madison Ave., New York 22, N. Y.; or 1107 Warner Bldg., Washington 4, D. C.

Aeronautical Engineering Review, Institute of Aeronautical Sciences, 2 E. 64th St., New York 21, N. Y.

Agricultural Engineering, American Society of Agricultural Engineers, 505 Pleasant St., St. Joseph, Mich.

Aircraft Engineering, Bunhill Publications, Ltd., 12 Bloomsbury Square, London, W.C.1, England.

Aircraft Production, Iliffe & Sons, Ltd., Dorset House, Stamford St., London S.E.1, England.

Alloy Metals Review, High Speed Steel Alloys, Ltd., Ditton Road, Widnes, Lancashire, England.

American Ceramic Society Bulletin, 2525 N. High St., Columbus 2, Ohio.

American Ceramic Society, Journal, 2525 N. High St., Columbus 2, Ohio.

American Chemical Society, Journal, 1155 16th St., N.W., Washington 6, D. C.

American Electroplaters Society, Proceedings, Box 168, Jenkintown, Pa.

American Foundryman, American Foundrymen's Society, 616 S. Michigan Ave., Chicago 5, Ill.

American Foundrymen's Society, Transactions, 616 S. Michigan Ave., Chicago 5, Ill.

American Gas Association, Monthly, American Bldg., Brattleboro, Vt.; or 420 Lexington Ave., New York 17, N. Y.

American Gas Association, Proceedings, 420 Lexington Ave., New York 17, N. Y.

American Gas Journal, 205 E. 42nd St., New York 17, N. Y.

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American Iron and Steel Institute, Yearbook, 350 5th Ave., New York 1, N. Y.

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American Medical Association, Journal, 535 N. Dearborn St., Chicago 10, Ill.

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Bakelite Review, Bakelite Div., Union Carbide and Carbon Copr., 30 E. 42nd St., New York 17, N. Y.

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C

CADO Technical Data Digest, Central Air Documents Office, Wright-Patterson Air Force Base, Dayton, Ohio.

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Drilling, Associated Publishers, Inc., 2115 N. St. Paul St., Dallas, Tex.

Drilling Contractor, American Association of Oilwell Drilling Contractors, 321 Reserve Loan Life Bldg., 505 N. Ervay St., Dallas 1, Tex.

Du Pont Magazine, E. I. Du Pont de Nemours and Co., Inc., Wilmington, Del.

E

Economic Geology and the Bulletin of the Society of Economic Geologists, Economic Geology Publishing Co., M. M.

Leighton, Business Manager, Urbana, Ill.

Edgar Allen News, Edgar Allen & Co., Ltd., Imperial Steel Works, Sheffield 9, England.

Edison Electric Institute Bulletin, 56th & Chestnut Sts., Philadelphia 39, Pa.; or 420 Lexington Ave., New York 17, N. Y.

Electric Furnace Steel Conference Proceedings, American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York 18, N. Y.

Electric Light and Power, Electrical Publications, Inc., 22 E. Huron St., Chicago 11, Ill.

Electrical Engineering, American Institute of Electrical Engineers, 33 W. 39th St., New York 18, N. Y.

Electrochemical Society, Journal, 235 W. 102nd St., New York 25, N. Y.

Electrochemical Society, Transactions, 235 W. 102nd St., New York 25, N. Y. (paging same as Journal; abstracts appear under the latter).

Electrodepositors' Technical Society, Journal, 27 Islington, London N.1, England.

Electronic Engineering, 28 Essex St., Strand, London W.C.2, England.

Electronics, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.

Electroplating and Metal Finishing, 83-85 Udney Park Rd., Teddington, Middlesex, England.

Enamelist, Enamelist Publishing Co., 4150 56th St., Cleveland 5, Ohio.

Endeavour, 26 Dover St., London W. 1, England.

Engineer, 28 Essex St., Strand, London, W.C.2, England.

Engineering, 35-36 Bedford St., Strand, London W.C.2, England.

Engineering Bulletin, Purdue University, Lafayette, Ind.

Engineering and Chemical Digest, S. A. Trade & Technical Publishing Co. (Pty.), 307 P.F.A.C. Gebou, 15 de Villiers St., Johannesburg, South Africa.

Engineering Experiment Station News (See Ohio State University, Engineering Experiment Station News).

Engineering and Mining Journal, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.

Engineering News-Record, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.

Engineers' Digest, 120 Wigmore St., London W.1, England; or 360 Madison Ave., New York 17, N. Y.

Ethyl News, Ethyl Corp., 405 Lexington Ave., New York 17, N. Y.

F

Factory Management and Maintenance, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.

Faraday Society, Transactions, 6 Gray's Inn Square, London W.C.1, England; or Aberdeen Univ. Press, Ltd., 6 Upper Kirkgate, Aberdeen, Scotland.

Fasteners, Industrial Fasteners Institute, 3648 Euclid Ave., Cleveland 15, Ohio.

Finish, Dana Chase Publications, 360 N. Michigan Ave., Chicago 1, Ill.

Flow, 1240 Ontario St., Cleveland 13, Ohio.

Food Industries, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.

Foote Prints, Foote Mineral Co., 18 W. Chelten Ave., Philadelphia 44, Pa.

Foreign Commerce Weekly, Supt. of Documents, U. S. Government Printing Office, Washington 25, D. C.

Fortune, Time, Inc., 540 N. Michigan Ave., Chicago 11, Ill.

Foundry, Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio.

Foundry Trade Journal, 49 Wellington St., Strand, London W.C.2, England.

Franklin Institute, Journal, Prince and Lemon Sts., Lancaster, Pa.; or Benjamin Franklin Parkway at 20th St., Philadelphia, Pa.

Frontier, Armour Research Institute, 35 E. 33rd St., Chicago 16, Ill.

Fuel, Butterworths Scientific Publications, Ltd., 4-6 Bell Yard, Temple Bar, London W.C.2, England.

G

Gas Age, Moore Publishing Co., Emmett St., Bristol, Conn.

Gas Journal, Walter King, Ltd., 11 Bolt Court, Fleet St., London E.C.4, England.

Gas Times, 29 Grove Rd., Leighton Buzzard, Beds., England.

General Electric Review, General Electric Co., 1 River Rd., Schenectady 5, N. Y.

Glass Industry, Ogden Publishing Co., 55 W. 42nd St., New York 18, N. Y.

H

Heating, Piping & Air Conditioning, Keeney Publishing Co., 6 N. Michigan Ave., Chicago 2, Ill.

Heating and Ventilating, Industrial Press, 148 Lafayette St., New York 13, N. Y.

I

Inco Magazine, International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.
Indian Academy of Sciences, Proceedings, Bangalore, India.
Indian Institute of Metals, Transactions, 102A Netaji Subhas Rd., Calcutta, India.
Industrial Chemist (See Industrial Chemist and Chemical Manufacturer).
Industrial Chemist and Chemical Manufacturer, 33 Tothill St., Westminister, London S.W.1, England.
Industrial Diamond Review, N.A.G. Press, Ltd., 226 Latymer Court, Hammersmith, London W.6, England. (U. S. Agent: Henry Paulson & Co., 131 S. Wabash Ave., Chicago, Ill.)
Industrial and Engineering Chemistry, American Chemical Society, 1155 16th St., N.W., Washington 6, D. C.
Industrial Finishing, Practical Publications, Inc. 1142 N. Meridian St., Indianapolis 4, Ind.
Industrial Gas, Moore Publishing Co., 9 E. 38th St., New York 16, N. Y.
Industrial Heating, National Industrial Publishing Co., Union Trust Bldg., Pittsburgh 19, Pa.
Industrial Waste Conference, Proceedings, Purdue University, Lafayette, Ind.
Industry and Power, Maujer Publishing Co., St. Joseph, Mich.
Industry & Welding, Industrial Publishing Co., 1240 Ontario St., Cleveland 13, Ohio.
Inland Printer, Maclean-Hunter Publishing Corp., 309 W. Jackson Blvd., Chicago 6, Ill.
Institute of British Foundrymen, Proceedings, St. John St. Chambers, Deansgate, Manchester 3, England.
Institute of Fuel, Journal, 18 Devonshire St., London W.1, England.
Institute of Metals, Journal, 4 Grosvenor Gardens, London S.W.1, England.
Institute of Petroleum, Journal, Manson House, 26 Portland Place, London W.1, England.
Institute of Radio Engineers, Proceedings, 1 E. 79th St., New York 21, N. Y.
Institute of Welding, Transactions, 2 Buckingham Palace Gardens, London S.W.1, England.
Institution of Electrical Engineers, Proceedings, Savoy Place, London W.C.2, England.
Institution of Mechanical Engineers, Proceedings, Storey's Gate, St. James Park, London S.W.1, England.
Institution of Mining and Metallurgy, Bulletin, Salisbury House, Finsbury Circus, London E.C.2, England.
Institution of the Rubber Industry, Transactions, 12 Whitehall, London S.W.1, England.
Instrumentation, Minneapolis-Honeywell Regulator Co., Wayne and Windrim Aves., Philadelphia 44, Pa.
Instruments, Instruments Publishing Co., 921 Ridge Ave., Pittsburgh 12, Pa.
International Congress for Applied Mechanics, Proceedings, Congress Secretary, Imperial College of Science and Technology, South Kensington, London, England.
International Congress on Pure and Applied Chemistry, Proceedings, (XIth), The Chemical Society, Burlington House, London W.1, England.
IRI Transactions, Institution of the Rubber Industry, 12 Whitehall, London S.W.1, England.
Iron Age, 100 E. 42nd St., New York 17, N. Y.
Iron and Steel, Louis Cassier Co., Ltd., Dorset House, Stamford St., London, S.E.1, England.
Iron and Steel Engineer, Association of Iron and Steel Engineers, 1010 Empire Bldg., Pittsburgh 22, Pa.
Iron and Steel Institute, Journal, 4 Grosvenor Gardens, London S.W.1, England.

J

Journal of the Acoustical Society of America, American Institute of Physics, 57 E. 55th St., New York 17, N. Y.
Journal of the Aeronautical Sciences, Institute of Aeronautical Sciences, 2 E. 64th St., New York 21, N. Y.
Journal of the American Ceramic Society, 2525 N. High St., Columbus 2, Ohio.
Journal of the American Chemical Society, 1155 16th St., N.W., Washington 6, D. C.
Journal of the American Medical Association, 535 N. Dearborn St., Chicago 10, Ill.
Journal of the American Society of Naval Engineers, 605 F. St., N.W., Washington 4, D. C.
Journal, American Waterworks Association, 500 5th Ave., New York 18, N. Y.
Journal of the American Welding Society (See Welding Journal).
Journal, American Zinc Institute, 60 E. 42nd St., New York 17, N. Y.
Journal of Applied Mechanics, American

Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y.

Journal of Applied Physics, American Institute of Physics, 57 E. 55th St., New York 22, N. Y.

Journal of the Birmingham Metallurgical Society, 253 Longbridge Lane, Northfield, Birmingham 31, England.

Journal of the Chemical, Metallurgical, & Mining Society of South Africa, Kelvin House, Marshall and Hollard Sts., Johannesburg, South Africa.

Journal of Chemical Physics, American Institute of Physics, 57 E. 55th St., New York 22, N. Y.

Journal of the Chemical Society, Burlington House, London W.1, England.

Journal of Colloid Science, Academic Press, Inc., 215 E. 23rd St., New York 10, N. Y.

Journal of the Electrochemical Society, 235 W. 102nd St., New York 25, N. Y.

Journal of the Electrodepositors' Technical Society, 27 Islington, London N. 1, England.

Journal of the Franklin Institute, Prince and Lemon Sts., Lancaster, Pa.; or Benjamin Franklin Parkway at 20th St., Philadelphia 3, Pa.

Journal of the Institute of Fuel, 18 Devonshire St., London W.1, England.

Journal of the Institute of Metals, 4 Grosvenor Gardens, London S.W.1, England.

Journal of the Institute of Petroleum, Manson House, 26 Portland Place, London W.1, England.

Journal of the Iron and Steel Institute, 4 Grosvenor Gardens, London S.W.1, England.

Journal of Mathematics and Physics, Massachusetts Institute of Technology, Cambridge 39, Mass.

Journal of Metals, American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York 18, N. Y.

Journal of the Oil & Colour Chemists' Association, Aldwych House, Aldwych, London W.2, England.

Journal of the Optical Society of America, American Institute of Physics, 57 E. 55th St., New York 22, N. Y.

Journal of Petroleum Technology, American Institute of Mining & Metallurgical Engineers, 29 W. 39th St., New York 18, N. Y.

Journal of Physical & Colloid Chemistry, Williams & Wilkins Co., Mt. Royal and Guilford Aves., Baltimore 2, Md.

Journal of Polymer Science, Interscience Publishers, Inc., 250 5th Ave., New York 1, N. Y.

Journal of Research of the National Bureau of Standards, Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Journal of Scientific & Industrial Research, Council of Scientific & Industrial Research, "P" Block, Raisina Road, New Delhi, India.

Journal of Scientific Instruments, Institute of Physics, 47 Belgrave Square, London S.W.1, England.

Journal of Scientific Instruments and of Physics in Industry, Institute of Physics, 47 Belgrave Square, London S.W.1, England. (Replaced by Journal of Scientific Instruments and by British Journal of Applied Physics).

Journal of the Society of Chemical Industry, 56 Victoria St., London S.W.1, England.

Journal of the Society of Glass Technology, "Elmfield," Northumberland Rd., Sheffield 10, England.

Journal of the West of Scotland Iron and Steel Institute, 39 Elmbank Crescent, Glasgow, Scotland.

L

Light Metal Age, 220 S. State St., Chicago 4, Ill.

Light Metals, Temple Press, Ltd., Bowling Green Lane, London E.C.1, England.

Linde Tips and Oxy-Acetylene Tips (Formerly Linde Tips), Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

Lubrication Engineering, American Society of Lubrication Engineers, 343 S. Dearborn St., Chicago 4, Ill.

M

Machine Design, Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio.

Machine and Tool Blue Book, Hitchcock Publishing Co., 222 E. Willow Ave., Wheaton, Ill.

Machinery (American), Industrial Press, 148 Lafayette St., New York 13, N. Y.

Machinery (London), Machinery Publishing Co., Ltd., National House, West St., Brighton 1, England.

Machinery Lloyd (Overseas Edition), 6 Cavendish Place, Regent St., London W.1, England.

Magazine of Magnesium, Brooks & Perkins, Inc., 1950 W. Fort St., Detroit 16, Mich.

Magnesium Review and Abstracts, Magnesium Elektron, Ltd., and F. A. Hughes & Co., Ltd., Bath House, 82 Piccadilly, London N.W.1, England.

Mainspring, Associated Spring Corp., Bristol, Conn.

Marine Engineering and Shipping Review, Simmons-Boardman Publishing Corp., 1309 Noble St., Philadelphia, Pa.

Materials & Methods, Reinhold Publishing Corp., 330 W.42nd St., New York 18, N. Y.

Mechanical Engineering, American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y.

Mechanical Topics, International Nickel Co., 67 Wall St., New York 5, N. Y.

Mechanization, Munsey Bldg., Washington 4, D. C.

Metal Finishing, Finishing Publications, Inc., 11 W.42nd St., New York 18, N. Y.

Metal Industry, Louis Cassier Co., Ltd., Dorset House, Stamford St., London S.E.1, England.

Metal Powder Association, Proceedings 420 Lexington Ave., New York 17, N. Y.

Metal Progress, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

Metal Treating, Metal Treating Institute, 271 North Ave., New Rochelle, N. Y.

Metal Treatment and Drop Forging, 49 Wellington St., Strand, London W. C. 2, England.

Metallurgia, Kennedy Press, Ltd., 31 King St., West, Manchester 3, England.

Metals, Atlas Publishing Co., 425 W. 25th St., New York 1, N. Y.

Metals Review, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

Microtecnic (English Edition), Editions Scriptar S. A., Lausanne, Switzerland. (U. S. Agent: Overseas Publishers Representatives, 66 Beaver St., New York 4, N. Y.)

Midwest Engineer, Western Society of Engineers, 84 E. Randolph St., Chicago 1, Ill.

Midwest Power Conference, Proceedings, Illinois Institute of Technology, 2300 Federal St., Chicago, Ill.

Mine & Quarry Engineering, 23 Great Queen St., London W.C.2, England.

Mines Magazine, Colorado School of Mines Alumni Assn., Robert W. Evans, Secretary, 734 Cooper Bldg., Denver 2, Colo.

Mining Congress Journal, American Mining Congress, 1102 Ring Bldg., Washington 2, D. C.

Mining Engineering, American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York 18, N. Y.

Mining Journal, 15 George St., Mansion House, London E.C.4, England.

Mining Magazine, Mining Publications, Ltd., Salisbury House, London E. C. 2, England.

Mining World, American Trade Journals, Inc., 121 2nd St., San Francisco 5, Calif.

Modern Industrial Press, Andresen, Inc., Windsor Manor, P. O. Box 687, Pittsburgh 30, Pa.

Modern Industry, Magazines of Industry, Inc., 400 Madison Ave., New York 17, N. Y.

Modern Lithography, Industry Publications, Inc., 254 W. 31st St., New York 1, N. Y.

Modern Metals, Modern Metals Publishing Co., 206 S. Michigan Ave., Chicago 4, Ill.

Modern Plastics, 122 E. 42nd St., New York 17, N. Y.

Murex Limited Review, Murex, Ltd., Rainham, Essex, England.

N

National Academy of Sciences, Proceedings, 2101 Constitution Ave., Washington 25, D. C.

National Association of Corrosion Engineers (See Corrosion).

National Bureau of Standards, Journal of Research (See Journal of Research of the National Bureau of Standards).

National Bureau of Standards, Technical News Bulletin, Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

National Lithographer, National Lithographer Publishing Co., 1 Sherman Ave., Jersey City 7, N. J.

National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings, 29 W. 39th St., New York 18, N. Y.

Nature, Macmillan & Co., Ltd., St. Martin's St., London W.C.2, England.

Nickel Bulletin, Mond Nickel Co., Ltd., Sunderland House, Curzon St., London W.1, England.

Nickel Topics, International Nickel Co., 67 Wall St., New York 5, N. Y.

Non-Destructive Testing, Society for Non-Destructive Testing, Skokie, Ill.

Nucleonics, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.

O

Official Digest, Federation of Paint and Varnish Products Clubs, 1524 Chestnut St., Philadelphia, Pa.

Ohio State University, Engineering Experiment Station News, Columbus, Ohio.

Oil & Colour Chemists' Association, Journal, Aldwyck House, Aldwyck, London W.2, England.

Oil and Gas Journal, Petroleum Publishing Co., 211 S. Cheyenne Ave., Tulsa 1, Okla.

Optical Society of America, Journal, American Institute of Physics, 57 E. 55th St., New York 22, N. Y.

Ordnance, American Ordnance Association, 705 Mills Bldg., Washington 6, D. C.

Organic Finishing, Finishing Publications, Inc., 11 W. 42nd St., New York 18, N. Y.

P

Paint Manufacture, Leonard Hill, Ltd., 17 Stratford Place, London W.1, England.

Paint, Oil & Chemical Review, Trade Review Co., 537 Dearborn St., Chicago 5, Ill.

Paint Technology 5 Grange Court, Pinner, Middlesex, England.

Paint and Varnish Production, Powell Magazines, Inc., 855 Avenue of the Americas, New York 1, N. Y.

Paint and Varnish Production Manager (See Paint and Varnish Production).

Paper Makers' Association of Great Britain & Ireland, Proceedings of the Technical Section, Melbourne House, Aldwyck, London W.C.2, England.

Paper Mill News, L. D. Post, Inc., 1309 Noble St., Philadelphia 23, Pa.

Paper Trade Journal, Lockwood Trade Journal Co., Inc., 15 W. 47th St., New York 19, N. Y.

Petroleum Engineer, Petroleum Engineer Publishing Co., Irwin-Keasler Bldg., Dallas 1, Tex.

Petroleum Processing, National Petroleum Publishing Co., 1213 W. 3rd St., Cleveland 13, Ohio.

Petroleum Refiner, Gulf Publishing Co., Box 2608, Houston 1, Tex.

Philips Research Reports, N. V. Philips' Gloeilampenfabrieken, Technical and Scientific Literature Dept., Eindhoven, Netherlands.

Philips Technical Review, N. V. Philips' Gloeilampenfabrieken, Technical and Scientific Literature Dept., Eindhoven, Netherlands.

Philosophical Magazine, Taylor and Francis, Ltd., Red Lion Court, Fleet St., London E.C.4, England.

Physica (mostly English), Martinus Nijhoff, The Hague, Netherlands.

Physical Review, American Institute of Physics, 57 E. 55th St., New York 22, N. Y.

Physical Society, Proceedings, 1 Lowther Gardens, Prince Consort Rd., London S.W.7, England.

Physics Today, American Institute of Physics, 57 E. 55th St., New York, N. Y.

Photographic Journal, Royal Photographic Society, 16 Princess Gate, London S.W.1, England.

Pig Iron Rough Notes, Sloss-Sheffield Steel & Iron Co., Birmingham, Ala.

Plant, Plant Publishing Co., St. Joseph, Mich.

Plastic Institute, Transactions, The Adelphi, Adam St., London W.C.2, England.

Plating, American Electroplaters' Society, 473 York Rd., Jenkintown, Pa.

Plating Notes, Defence Research Laboratories, Maribyrnong, Victoria, Australia.

Powder Metallurgy Bulletin, 320 Yonkers Ave., Yonkers 2, N. Y.

Power, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.

Power Engineering (formerly Power Generation), Technical Publishing Co., 110 S. Dearborn St., Chicago 3, Ill.

Proceedings, American Electroplaters Society, Box 168, Jenkintown, Pa.

Proceedings, American Petroleum Institute, 50 W. 50th St., New York 20, N. Y.

Proceedings, American Railway Engineering Association, 59 E. Van Buren, Chicago 5, Ill.

Proceedings, Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York 15, N. Y.

Proceedings of the Electric Furnace Steel Conference, American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York 18, N. Y.

Proceedings of the XIth International Congress on Pure and Applied Chemistry, The Chemical Society, Burlington House, London W.1, England.

Proceedings of the Fourth Industrial Waste Conference (See Industrial Waste Conference, Proceedings).

Proceedings of the Indian Academy of Sciences, Bangalore, India.

Proceedings of the Institute of British Foundrymen, St. John St. Chambers, Deansgate, Manchester 3, England.
Proceedings of the Institution of Electrical Engineers, Savoy Place, London W.C.2, England.
Proceedings of the I.R.E., Institute of Radio Engineers, 1 E. 79th St., New York 21, N. Y.
Proceedings, Metal Powder Association, 420 Lexington Ave., New York 17, N. Y.
Proceedings of the Midwest Power Conference, Illinois Institute of Technology, 3300 Federal St., Chicago, Ill.
Proceedings of the National Academy of Sciences, 2101 Constitution Ave., Washington 25, D. C.
Proceedings of the National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York 18, N. Y.
Proceedings of the Physical Society, 1 Lowther Gardens, Prince Consort Rd., London S.W.7, England.
Proceedings of the Royal Society, Cambridge University Press, Bentley House, London N.W.1, England; or 51 Madison Ave., New York, N. Y.
Proceedings of the Seventh International Congress for Applied Mechanics (See International Congress for Applied Mechanics, Proceedings).
Proceedings of the Society for Experimental Stress Analysis, Central Square Sta., P. O. Box 168, Cambridge 39, Mass.
Proceedings of the Technical Section, Paper Makers' Association of Great Britain & Ireland, Melbourne House, Aldwyck, London W.C.2, England.
Producers Monthly, Bradford District Pennsylvania Oil Producers Association, Bradford, Pa.
Product Engineering, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.
Production Engineering & Management, Bramson Publishing Co., 2842 W. Grand Blvd., Detroit 2, Mich.
Products Finishing, Gardner Publications, Inc., 431 Main St., Cincinnati 2, Ohio.
Progressive Architecture, Reinhold Publishing Corp., 330 W. 42nd St., New York 18, N. Y.
Purdue University, Engineering Bulletin (See Engineering Bulletin (Purdue University)).

Q

Quarterly of Applied Mathematics, Brown University, Providence 12, R. I.; or Box 2-W, Richmond 5, Va.
Quarterly of the Colorado School of Mines, Golden, Colo.

R

Railway Age, 30 Church St., New York 7, N. Y.
Railway Engineering and Maintenance, Simmons-Boardman Publishing Corp., 79 W. Monroe St., Chicago 3, Ill.
Railway Mechanical and Electrical Engineer, Simmons-Boardman Publishing Corp., 1309 Noble St., Philadelphia, Pa.
RCA Review, RCA Laboratories Div., Radio Corp. of America, Princeton, N. J.
Refractories Journal, Sheffield Publishing Co., Ltd., 7 Chesterfield Gardens, Curzon St., Mayfair, London W.1, England.
Refrigerating Engineering, American Society of Refrigerating Engineers, 40 W. 40th St., New York 18, N. Y.
Reports on Progress in Physics, 1 Lowther Gardens, Prince Consort Rd., London S.W.7, England.
Research, Butterworths Scientific Publications, Ltd., 4-6 Bell Yard, Temple Bar, London W.C.2, England.
Research Engineer, Georgia Institute of Technology, Atlanta, Ga.
Review of Scientific Instruments, American Institute of Physics, 57 E. 55th St., New York 22, N. Y.
Reviews of Modern Physics, American Institute of Physics, 57 E. 55th St., New York 22, N. Y.
Reynolds Metals Technical Advisor, Reynolds Metals Co., 2500 S. 3rd St., Louisville, Ky.
Rock Products, MacLean-Hunter Publishing Corp., 309 W. Jackson Blvd., Chicago 6, Ill.
Roofing, Siding and Insulation, Cantor Publishing Co., 45 W. 45th St., New York 19, N. Y.
Royal Institute of Technology, Transactions, Stockholm 26, Sweden.
Royal Society, Proceedings, Cambridge University Press, Bentley House, London N.W.1, England; or 51 Madison Ave., New York, N. Y.
Rubber Age., Palmerton Publishing Co., 250 W. 57th St., New York 19, N. Y.
Rubber Chemistry and Technology, C. W. Christensen, Treasurer, Division of

Rubber Chemistry, American Chemical Society, Monsanto Chemical Co., 920 Brown St., Akron, Ohio.

S

SAE Journal, Society of Automotive Engineers, 29 W. 39th St., New York 18, N. Y.

SAE Quarterly Transactions, Society of Automotive Engineers, 29 W. 39th St., New York 18, N. Y.

Science, American Association for the Advancement of Science, 1515 Massachusetts Ave., Washington 5, D. C.

Science & Engineering (previously Journal of the India Society of Engineers), India Society of Engineers, 12 Netaji Subhas Rd., Calcutta 1, India.

Science Progress, Edward Arnold & Co., 41 Maddox St., London W.1, England.

Scientific Monthly, American Association for Advancement of Science, 1515 Massachusetts Ave., N.W., Washington 5, D. C.

Screw Machine Engineering, Screw Machine Publishing Co., 65 Broad St., Rochester 14, N. Y.

Seventh International Congress for Applied Mechanics, Proceedings (See International Congress for Applied Mechanics, Proceedings).

Sewage and Industrial Wastes, Federation of Sewage and Industrial Wastes Associations, 325 Illinois Bldg., Champaign, Ill.

Sheet Metal Industries, Industrial Newspapers, Ltd., 49 Wellington St., London W.C.2, England.

Sheet Metal Worker, Edwin A. Scott Publishing Co., 45 W. 45th St., New York 19, N. Y.

Skillings' Mining Review, David N. Skillings, 810 Fidelity Bldg., Duluth 2, Minn.

Society of Automotive Engineers, Journal (See SAE Journal).

Society of Automotive Engineers, Quarterly Transactions (See SAE Quarterly Transactions).

Society of Chemical Industry, Journal, 56 Victoria St., London S.W.1, England.

Society for Experimental Stress Analysis, Proceedings, Central Square Sta., P. O. Box 168, Cambridge 39, Mass.

Society of Glass Technology, Journal, Elmfield, Northumberland Rd., Sheffield 10, England.

Solid Fuel Engineer, Box 7, Columbia, Mo.

Spectrochimica Acta, Butterworth-Springer, Ltd., 9 Culford Mansions, Culford Gardens, London S.W.3, England. (U.S. Agent: Jarrell-Ash Co., 165 Newbury St., Boston 16, Mass.)

Standardization, American Standards Association, 70 E. 45th St., New York 17, N. Y.

Steel, Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio.

Steel Horizons, Allegheny Ludlum Steel Corp., Pittsburgh, Pa.

Steel Processing, Steel Publications, Inc., 4 Smithfield St., Pittsburgh 30, Pa.

Steelways, American Iron and Steel Institute, 350 5th Ave., New York 1, N. Y.

Sylvania Technologist, Technical Relations Dept., Sylvania Electric Products, Inc., 40-22 Lawrence St., Flushing, N. Y.

T

Technical Advisor, Reynolds Metals Co., 2500 S. 3rd St., Louisville, Ky.

Technical Data Digest (See CADO Technical Data Digest).

Technical News Bulletin (See National Bureau of Standards, Technical News Bulletin).

Tele-Vision Engineering, Bryan Davis Publishing Co., 52 Vanderbilt Ave., New York 17, N. Y.

Testing Topics, Baldwin Locomotive Works, Philadelphia 42, Pa.

Tool & Die Journal, Huebner Publications, 1975 Lee Road, Cleveland 18, Ohio.

Tool Engineer, American Society of Tool Engineers, 10700 Puritan Ave., Detroit 21, Mich.

Transactions of the American Foundrymen's Society, 616 S. Michigan Ave., Chicago 5, Ill.

Transactions of the American Institute of Electrical Engineers, 33 W. 39th St., New York 18, N. Y.

Transactions of the American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York 18, N. Y.

Transactions of the American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y.

Transactions of the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

Transactions of the British Ceramic Society, North Staffordshire Technical College, Stoke-on-Trent, England.

Transactions of the Canadian Institute of Mining and Metallurgy (See Canadian Mining and Metallurgical Bulletin).

Transactions of the Electrochemical Society, 235 W. 102nd St., New York 25, N. Y., (paging same as Journal; abstracts appear under latter).
Transactions of the Faraday Society, 6 Gray's Inn Square, London W.C.1, England; or Aberdeen University Press, Ltd., 6 Upper Kirkgate, Aberdeen, Scotland.
Transactions of the Indian Institute of Metals, 102A Netaji Subhas Rd., Calcutta 1, India.
Transactions of the Institute of Welding, 2 Buckingham Palace Gardens, London S.W.1, England.
Transactions of the Institution of the Rubber Industry, 12 Whitehall, London S.W.1, England.
Transactions of the Royal Institute of Technology, Stockholm 26, Sweden.
Trend in Engineering at the University of Washington, Engineering Experiment Station, 127 More Hall, University of Washington, Seattle 5, Wash.

U

United Effort, United Engineering & Foundry Co., First National Bank Bldg., Pittsburgh, Pa.
University of Illinois, Bulletin, Urbana, Ill.

V

Vancoram Review, Vanadium Corp. of America, 420 Lexington Ave., New York 17, N. Y.

W

Water and Sewage Works, 404 N. Wesley Ave., Mt. Morris, Ill.; or 22 W. Maple St., Chicago 10, Ill.
Welder, Murex Welding Processes, Ltd., Waltham Cross, Herts., England.
Welding, Louis Cassier, Ltd., Dorset House, Stamford St., London S.E.1, England.
Welding Engineer, 210 S. DesPlaines St., Chicago 6, Ill.
Welding Journal, American Welding Society, 33 W. 39th St., New York 18, N. Y.
Welding Research (Bound with Institute of Welding, Transactions; See latter for address.) Also available from British Welding Research Association, 29 Park Crescent, London W.1, England.
West of Scotland Iron and Steel Institute, Journal, 39 Elmbank Crescent, Glasgow, Scotland.
Western Machinery and Steel World, 580 Market St., San Francisco 4, Calif.
Western Metals, 198 S. Alvarado St., Los Angeles 4, Calif.
Western Miner, Gordon Black Publications, Ltd., 505 Metropolitan Bldg., Vancouver, B. C., Canada.
Western Union Technical Review, Western Union Telegraph Co., 60 Hudson St., New York 13, N. Y.
Westinghouse Engineer, Westinghouse Electric Corp., 306 4th Ave., P. O. Box 1017, Pittsburgh 30, Pa.
Wire Industry, 33 Furnival St., London E.C.4, England.
Wire and Wire Products, Quinn-Brown Publishing Corp., 300 Main St., Stamford, Conn.
Wireless World, Iliffe & Sons, Ltd., Dorset House, Stamford St., London S.E.1, England.
Wood, American Lumberman, Inc., 139 N. Clark St., Chicago 2, Ill.
World Oil, Gulf Publishing Co., 3301 Buffalo Dr., Houston 6, Tex.

Y

Yearbook of the American Iron and Steel Institute, 350 5th Ave., New York 1, N. Y.

II. Foreign Language Periodicals

Most of the foreign journals (except Russian) are available through Stechert-Hafner, Inc., 31 E. 10th St., New York 3, N. Y. The Russian journals are available through Four Continent Book Corp., 38 W. 58th St., New York 16, N. Y.

A

Academie des Sciences, Comptes Rendus hebdomadaires des Seances (See Comptes Rendus (France).
Academy of Sciences of the USSR, Bulletin, Physical Series (See Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya).
Academy of Sciences of the USSR, Bulletin, Section of Chemical Sciences (See

(See Izvestiya Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk).

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Academy of Sciences of the USSR, Reports (See Diklady Akademii Nauk SSSR).

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Acta Chemica Scandinavica (English, French, or German), Einar Munksgaard, Norregade 6, Copenhagen, Denmark.

Acta Crystallographica (English, French, or German), American Institute of Physics, 57 E. 55th St., New York 22, N. Y., or Cambridge University Press, Bentley House, Euston Road, London N.W.1, England.

Acta Polytechnica (English, French, or German), Royal Institute of Technology, Stockholm, Sweden.

Alluminio (Italian), Istituto Sperimentale dei Metalli Leggeri, 8/10 Via della Posta, Milan, Italy.

Analytica Chimica Acta (English, French, or German), Elsevier Publishing Co., 250 5th Ave., New York 1, N. Y.

Angewandte Chemie (German), Verlag Chemie, G.m.b.H., Bergstr., Weinheim 17a, Germany.

Annalen der Physik (German), Johann Ambrosius Barth Verlag, 18B Salomonstr., Leipzig C1, Germany.

Archiv für das Eisenhuttenwesen (German), Verlag Stahleisen M.b.H., 1 August Thyssen Str., Dusseldorf, Germany.

Archiv für Metallkunde (German), Verlag Chemie, G.m.b.H., Bergstr., Weinheim, Germany.

Archiv für Technisches Messen (German), R. Oldenbourg Verlag, 2b Lotzbeckstr., Munich, Germany.

Associacão Brasiliera de Metais, Boletim (Portuguese), San Paulo, Brazil.

ATM (See Archiv für technisches Messen).

Avtogennoe Delo (Russian), 2a Spartakovskaya, 3 Glavkislorod, Moscow, U.S.S.R.

B

Berichte der Deutschen Keramischen Gesellschaft e. V. und des Vereins Deutscher Emailfachleute e. V. (German), 15 Poppelsdorfer Allee, Bonn-Rh., Germany.

Boletim da Associacão Brasiliera de Metais (See Associacão Brasiliera de Metais, Boletim).

Brennstoffe-Warme-Kraft, (German) Deutscher Ingenieur Verlag, G. m. b. H., 77 Prinz-Georg Str., Düsseldorf, Germany.

Bulletin of the Academy of Sciences of the USSR, Physical Series (See Izvestiya Akademii Nauk SSSR).

Bulletin of the Academy of Sciences of the USSR, Section of Chemical Sciences (See Izvestiya Akademii Nauk SSSR).

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Bulletin of the Machine Construction Industry (See Vestnik Mashinostroeniya).

Bulletin de la Société Chimique de France (See Société Chimique de France, Bulletin).

C

Casting Institute of Japan, Journal (Japanese), Totsuka-machi, 1-chome, 500 Sinjiku-ku, Tokyo, Japan.

Centraal Instituut voor Materiaal Onderzoek Afdeling Metalen (Dutch), Nijverheids-organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Nethlands.

Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques (French), 6 Rue de Lota, Paris 16, France.

Centre National de la Recherche Scientifique, Journal des Recherches (French), 13 Quai Anatole-France, Paris 7, France.

Chaleur & Industrie (French), 2 Rue des Tanneries, Paris 13, France.

Chemische Technik (German), Verlag Technik G.m.b.H., 41 Dorotheenstr., Berlin, N.W.7, Germany.

Chimia (French, German, or Italian), Rascher-Verlag, Zurich, Switzerland.

Circulaire d'Informations Techniques (French), 6 Rue de Lota, Paris 16, France.

Collection of Czechoslovak Chemical Communications (English or French), Czechoslovak Chemical Society, 24 Thamova, Prague 10, Czechoslovakia.

Colloid Journal (See Kolloidnyi Zhurnal).

Comptes Rendus (France) (French), Imprimerie Gauthier-Villars, 55 Quai des Grands-Augustins, Paris, France.

D

Das Gas-und Wasserfach (See Gas und Wasserfach).

Deutschen Keramischen Gesellachaft e. V. und des Vereins Deutscher Emailfachleutes e. V., Berichte (German), 15 Poppelsdorfer Allee, Bonn-Rh., Germany.
Die Neue Giesserei (See Neue Giesserei).
Doklady Akademii Nauk SSSR (Russian), Academy of Sciences of the U.S.S.R., 14 Volkhonka, Moscow, U.S.S.R.

E

Elektrichestvo (Russian), Glavnyi Pochtamt, 648 Pochtovyi Yashchik, Moscow, U.S.S.R.
Elektrowärme Technik (German), Elektro-Verlag W. Sachon KG, 2-4 Hermelestr., Mindelheim 13b, Germany.
Erdöl und Kohle (German), Industrieverlag von Hernhaussen Kommanditgesellschaft, 39 Lietzenburger Str., Berlin W15, Germany.

F

Factory Laboratory (See Zavodskaya Laboratoriya).
Fonderie (French), Éditions Techniques des Industries de la Fonderie, 12 Avenue Raphaël, Paris 16, France.
Fortschritte der Chemischen Forschung (German), 1 Jebenstr., Berlin-Charlottenburg 2, Germany.
Frequenz (German), Fachverlag Schiele and Schön, 10 Boppstr., Berlin S.W.29, Germany.
Fresenius' Zeitschrift für analytische Chemie (German), Springer-Verlag, 1 Jebenstr., Berlin-Charlottenburg, Germany.

G

Gas und Wasserfach (German), R. Oldenbourg, 31 Schliessfach, Munich 1, Germany.

H

Helvetica Chimica Acta (French, German, or Italian), Verlag Birkhauser A. G., Basel 7, Switzerland.
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Hutnické Listy (Czech), Mucednicka 8, Brno-Zabovresky, Czechoslovakia.
Hutnik (Polish), Robotnicza Spoldzielna Wydawnicza "Prasa," 11 Sobieskiego ul., Katowice, Poland.

I

Industrial Power (See Promyshlennaya Energetika).
Izvestiya Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk (Russian), Academy of Sciences of the U.S.S.R., Shubinskii per., d. 10, Moscow, U.S.S.R.
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J

Japan Institute of Metals, Journal (See Nippon Kinzoku Gakkai-Si).
Jernkontorets Annaler (Swedish), 6 Kungsträdgardsgatan, Stockholm C, Sweden.
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K

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Kolloidnyi Zhurnal (Russian), Academy of Sciences of the U.S.S.R., 14 Volkhonka, Moscow, U.S.S.R.

Kunststoffe (German), Carl Hanser Verlag, 27 Leonhard-Eck Str., Munich 27, Germany.

L

La Metallurgia Italiana (See Metallurgia Italiana).
Lastijdschrift (See Revue de la Soudure).
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M

Machine Tools and Equipment (See Stanki i Instrument).
Metalen (Dutch or English), Drukkerij-Uitgeverij "de Hofstad," 1-3 Scheepmakersstraat, 's-Gravenhage, Netherlands.
Metall (German), Metall-Verlag G.m.b.H., 38 Düsseldorfer Str., Berlin W15, Germany.
Metalloberfläche (German), Carl Hanser Verlag, Munich 27, Germany.
Metallurgia Italiana (Italian), Associazone Italiana di Metallurgia, 10 Via S. Paolo, Milan, Italy.
Metalurgia y Electricidad (Spanish), 47 Avenida de José Antonio, Madrid, Spain.
Métaux & Corrosion (French), Editions métaux, 32 Rue du Marechal-Joffre, St.-Germain-en-Laye (Seine-et-Oise), France.
Métaux et Industries (French), Editions métaux, 32 Rue du Marechal-Joffre, St.-Germain-en-Laye (Seine-et-Oise), France.
Mineracao e Metalurgia (Portuguese), 3 pigo, 135 Rua Sete de Setambro, Rio de Janeiro, Brazil.
Mitteilungen des Chemischen Forchungsinstitutes der Industrie Österreichs (German), 16 Lothrinerstrasse, Vienna 3, Austria.
Monatshefte für Chemie und verwandte Teile anderer Wissenschaften (German), Springer-Verlag, 5 Molkerbastei, Vienna 1, Austria.

N

Nature (See Priroda).
Neue Giesserei (German), 1 August Thyssen Str., Düsseldorf, Germany.
News of the Academy of Sciences of the U.S.S.R. (See Vestnik Akademii Nauk SSSR).
Nippon Kinzoku Gakkai-si (Mainly Japanese; English Abstracts), Japan Institute of Metals, Sendai, Japan.

O

Ogneupory (Russian), Metallurgizdat, 30 Tsvetnoi Blvd., Moscow, U.S.S.R.

P

Peat Industry (See Torfyanaya Promyshlennost).
Physica (English, French, or German), Martinus Nijhoff, The Hague, Netherlands.
Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa (Polish), Instytut Metalurgii, 12-14 Ul. K. Miarki, Gliwice, Poland.
Priroda (Russian), Academy of Sciences of the USSR, 9 Liniya, d. 12, Leningrad, U.S.S.R.
Progress in Chemistry (See Uspekhi Khimii).
Pro-Metal (French and German), Metallverband A.G., Berne, Switzerland.
Promyshlennaya Energetika (Russian), Gosenergoizdat, 10 Sheyuzovaya Naberezhnaya, Moscow, U.S.S.R.

R

Refractories (See Ogneupory).
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Revue de la Soudure (French or Flemish), 21 Rue des Drapiers, Brussels, Belgium.

S

Schweissen und Schneiden (German), Friedrich Vieweg & Sohn, 1 Burgplatz, Braunschweig, Germany.
Schweisstechnik (German), Schweisstechnische Zentralanstalt, 31 Schumanngasse, Vienna 18, Austria.
Schweizer Archiv für angewandte Wissenschaft und Technik (German or French), Buchdruckerei Vogt-Schild A. G., Solothurn, Switzerland.
Science of Powder (Japanese) Kyoto University, Kyoto, Japan.
Smit Mededelingen (Dutch), Willem Smit & Co.'s Transformatoren Fabriek N.V., Nijmegen, Netherlands.
Société Chimique de France, Bulletin (French), 28 Rue Saint-Dominique, Paris 7, France.

Soudure et Techniques Connexes (French), Publications de la Soudure Autogène, 39 Rue d'Amsterdam, Paris 8, France.

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Sprechsaal für Keramik; Glas; Email (German), Verlag des Sprechsaal, Müller & Schmidt, 2 Mauer, Coburg, Germany.

Stahl und Eisen (German), Verlag Stahleisen m.b.H., 1 August Thyssen Str., Düsseldorf, Germany.

Stanki i Instrument (Russian), "Mashgiz," Ministry of Heavy Machinery Manufacturing of the U.S.S.R., 4 Kuibysheva, pom. 12, Moscow 12, U.S.S.R.

T

Tecnica Italiana (Italian), 6 Via Beccaria, Trieste, Italy.

Torfyanaya Promyshlennost (Russian), Gosenergoizdat, 10 Shlyuzovaya Nabrezhnaya, Moscow, U.S.S.R.

U

Umschau (German), 20-22 Stuttgarter Verlag, Frankfurt-am-Main, Germany.

Uspekhi Khimii (Russian), Academy of Sciences of the U.S.S.R., 10 Shubinskii per., d. 10, Moscow, U.S.S.R.

V

VDI Zeitschrift (See Zeitschrift des Vereines Deutscher Ingenieure).

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Verres et Réfractaires (French), Société d'Éditions Verrières et Céramiques, 34 Rue Michel-Ange, Paris 16, France.

Vestnik Akademii Nauk SSSR (Russian), Academy of Sciences of the U.S.S.R., 10 Shubinskii per., d. 10, Moscow, U.S.S.R.

Vestnik Mashinostroeniya (Russian), Moscow, U.S.S.R.

Vide (French), Société Française des Ingénieurs Techniciens du Vide, 44 Rue de Rennes, Paris 6, France.

Von Roll Mitteilungen (German), Gesellschaft der Ludw. von roll'schen Eisenwerke A. G., Gerlafingen, Switzerland.

W

Welding (See Avtogennoe Delo).

Werkstoffe und Korrosion (Previously Archiv für Metallkunde) (German), Verlag Chemie G.m.b.H., Bergstr., Weinheim, Germany.

Z

Zavodskaya Laboratoriya (Russian), Government Bureau of the Metallurgical Industry, Moscow, U.S.S.R.

Zeitschrift für analytische Chemie, Fresenius' (German), Springer-Verlag, 1 Jebenstr., Berlin-Charlottenberg, Germany.

Zeitschrift für angewandte Physik (German), Springer-Verlag, 1 Jebenstr., Berlin, Charlottenberg, Germany.

Zeitschrift für anorganische und allgemeine Chemie (German), Johann Ambrosius Barth Verlag, Leipzig, Germany.

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Zeitschrift für Elektrochemie und angewandte physikalische Chemie (German), Verlag Chemie G. m. b. H., Bergstr., Weinheim, Germany.

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Zeitschrift für Metallkunde (German), Dr. Riederer Verlag, 50 Marienstr., Stuttgart S, Germany.

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Zeitschrift für Physik (German), Springer Verlag, Berlin, Germany.

Zeitschrift für Schweisstechnik (Journal de la Soudure) (German and French), 36 Stauffacherquai, Zurich 1, Switzerland.

Zeitschrift des Vereines Deutscher Ingenieure (German), 77 Prinz-George-Str., Dusseldorf, Germany.

Zhurnal Fizicheskoi Khimii (Russian), Academy of Sciences of the U.S.S.R. 9 Liniya, d. 12, Leningrad, U.S.S.R.

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Zhurnal Prikadnoi Khimii (Russian), Academy of Sciences of the U.S.S.R., 9 Liniya, d. 12, Leningrad, U.S.S.R.

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III. Miscellaneous Material

Aluminium Development Association, 33 Grosvenor St., London W.1, England.
American Electroplaters Society, 473 York Rd., Jenkintown, Pa.
American Foundryman's Society, 222 W. Adams St., Chicago 6, Ill.
American Iron and Steel Institute, 350 5th Ave., New York 1, N. Y.
American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y.
American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.
American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.
Atomic Energy Commission, Documents Publication Section, Technical Information Branch, P. O. Box E, Oak Ridge, Tenn.

Bethlehem Steel Co., Bethlehem, Pa.
British Iron and Steel Research Association, 11 Park Lane, London W.1, England.
British Nonferrous Metals Research Association, 81-91 Euston St., London N.W.1, England.
Bureau of Mines, Washington 25, D. C.
Bureau of Reclamation, Research and Geology Division, Denver, Colo.
Bureau of Standards (See National Bureau of Standards).

Centre de Documentation Sidérurgigue, 12 Rue de Madrid, Paris 8, France.
Colorado School of Mines, Golden, Colo.
Commonwealth Scientific and Industrial Research Organization, Commonwealth of Australia, Melbourne, Victoria, Australia.
Cornell University, Aeronautical Laboratory, Ithaca, N. Y.
Council for Scientific and Industrial Research, Commonwealth of Australia, Melbourne, Victoria, Australia.

Electrodepositors Technical Society, Northhampton St., London, E.C.1, England.
Engineering Experiment Station, Ohio State University, Columbus 10, Ohio.
Engineering Experiment Station, Pennsylvania State College, State College, Pa.
Engineering Experiment Station, University of Illinois, Urbana, Ill.

Geological Survey, U. S., Washington 25, D. C.

Institute of British Foundrymen, 49 Wellington St., London W.C.2, England.
Institute of Fuel, 18 Devonshire St., London W.1, England.
Institute of Metals, 4 Grosvenor Gardens, London S.W.1, England.
Institute of Petroleum, 26 Portland Place, London S.W.1, England.
Institute of Physics, 47 Belgrave Square, London S.W.1, England.
Institution of Metallurgists, 4 Grosvenor Gardens, London S.W.1, England.
Institution of Mining and Metallurgy, Finsbury Circus, London E.C.2, England.
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Kalgoorlie School of Mines, Kalgoorlie Metallurgical Laboratory, Kalgoorlie, Australia.

Massachusetts Institute of Technology, Cambridge, Mass.
Mineral Industries Experiment Station, Pennsylvania State College, State College, Pa.
Munitions Board Aircraft Committee, Subcommittee on Air Force-Navy-Civil Aircraft Design Criteria, Washington 25, D. C.

National Advisory Committee for Aeronautics, Washington 25, D. C.
National Bureau of Standards, Washington 25, D. C.
National Lead Co., 111 Broadway, New York, N. Y.
New York University, College of Engineering, 181st St. & University Ave., New York 53, N. Y.

Office of Naval Research, Library of Congress, Washington 25, D. C.
Ohio State University, Engineering Experiment Station, Columbus 10, Ohio.

Pennsylvania State College, Engineering Experiment Station, State College, Pa.
Pennsylvania State College, Mineral Industries Experiment Station, State College, Pa.
Pennsylvania State College, School of Mineral Industries, State College, Pa.
Purdue University, Lafayette, Ind.

Tin Research Institute, Fraser Rd., Greenford, Middlesex, England.

University of Illinois, Engineering Experiment Station, Urbana, Ill.
University of Melbourne, Metallurgical Laboratory, Melbourne, Australia.
U. S. Atomic Energy Commission (See Atomic Energy Commission).
U. S. Bureau of Mines (See Bureau of Mines).
U. S. Bureau of Reclamation, Research and Geology Division (See Bureau of Reclamation).
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SUBJECT INDEX

Since the annotations in the main section of this book are classified into 19 main sections primarily based upon processes and properties, the emphasis in this subject index has been placed on materials and products. Entries under names of processes and properties refer to general treatments of the subject; wherever possible, items have been indexed under the name of the material or product treated, with the process or property as subhead. Thus, material on the rolling of aluminum alloys has been indexed "Aluminum alloys, rolling", rather than as "Rolling, aluminum alloys". Similarly where process and property headings are used, either as main entries or as subheads, the more specific heading has been chosen. Thus, material on "stress-relief heat treatment" appears under "stress relief" rather than as a subdivision of "Heat treatment". In general, subject headings have been chosen to conform with the usage in the "ASM-SLA Metallurgical Literature Classification", published by the American Society for Metals, 1950. Alloy systems are indexed in the order of the constituent whose initial letter comes first in the alphabet, i. e., Copper-nickel; Tin-zinc, without regard to percentage composition.

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